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JOURNAL *of* FARM ECONOMICS

PROCEEDINGS

OF THE

ANNUAL MEETINGS

OF

THE AMERICAN FARM ECONOMIC ASSOCIATION

MEETING JOINTLY WITH

THE CANADIAN AGRICULTURAL

ECONOMICS SOCIETY

JULY 24-27, 1951, GUELPH, CANADA

THE AMERICAN FARM ECONOMIC ASSOCIATION
Volume XXXIII NOVEMBER, 1951 Number 4, Part 2

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Price: $5 per year

Entered as second class matter at the post office at Menasha, Wis. Acceptance for mailing at a special rate of postage provided for in the Act of February 28, 1925, paragraph 4, section 412, P. L. & R., authorized November 27, 1931.

THE JOURNAL OF FARM ECONOMICS is published quarterly, February, May, August and November by The American Farm Economic Association. Yearly subscription $5. Published at Menasha, Wisconsin. Printed in U.S.A.

JOURNAL
OF
FARM ECONOMICS

Vol. XXXIII November, 1951 No. 4, Part 2

EUROPEAN ECONOMIC INTEGRATION AND WORLD TRADE POLICY

F. A. KNOX
Queen's University, Canada

OF THREE major objectives of economic policy set by international agreement at the end of World War II, one has been successfully achieved, considerable progress has been made towards the second, and the year 1952 will see put to the test the ability and willingness of the nations to move toward the third. The recovery of production in that part of Europe which is still outside the Russian orbit has been beyond expectations. Negotiations to reduce customs tariffs conducted by the nations which adhere to the General Agreement on Trade and Tariffs have brought about a substantial reduction of tariff rates. However, the meagre results achieved at the late 1950 negotiations at Torquay, together with a tendency to slow up the speed of reductions in the most significant tariff in the world, that of the United States, suggest that the really difficult and testing stage in the tariff reduction process has been reached. Toward the third objective, the elimination of exchange controls on current transactions and quantitative restraints on trade, progress has been halting indeed. As the end of the postwar transition period approaches, the International Monetary Fund has been warning its member nations that they must either complete next year the elimination of exchange controls or give satisfactory explanations for their failure to do so.

The hesitation to reduce tariffs further and do away with quantitative restrictions on current transactions arises only in part from such problems as the dollar shortage or rearmament. There is a widespread and growing doubt in Europe about the current attempt to recreate a world trading system based on free and nondiscriminatory trade among the citizens of all the nations of the free world. Perhaps the most challenging embodiment of such doubts comes to light in the movement for the economic integration of western Europe. As the United States is the chief proponent of both these objectives, a world trading system and an integrated Europe,

such a statement may seem a paradox. It has long been observed, however, that there is an obvious possibility of conflict between the promotion of a nondiscriminatory, world-trading system and the encouragement of a European customs union or free-trading area whose members make concessions to each other which they do not, as the most-favoured-nation principle would require, extend to non-European countries.

The complex cross currents involved in this movement for European integration appeared vividly at the Brussels conference of the European League for Economic Cooperation in the first week of June 1951. To discuss it briefly may make more concrete some important current world trade trends and bring out choices in the field of international economic policy which the nations must shortly make. The League is a nonofficial body composed of politicians, bankers, businessmen, retired civil servants and economists who study the problems of European economic cooperation and attempt to influence public opinion through publications and by promoting the proposals agreed on at their various conferences. It is the economic wing of the European movement. At the Brussels conference there were present also small delegations of nonofficial people from each of the main countries of the Commonwealth: Australia, New Zealand, South Africa, India, Pakistan, Ceylon, and Canada. Before going to Brussels, these people held in London a preliminary conference with the British Section of the League.

The proceedings of the conference showed clearly that two forces had been at work in bringing it about at this time. The pressure in Europe for economic integration grows; there is also a spreading realization that to be complete and effective it must include the overseas countries upon whose markets Europe must rely. The bases of these two trends of opinion may be briefly indicated.

The increase in the urgency of greater European cooperation arises from both political and economic causes. Korea made the need to rearm more obvious. Germany's economic development ever more clearly demands the early and inextricable mixing of the German economy with that of Europe if the revival of German war-making potential is to be prevented. There is also a feeling of apprehension about the methods by which American foreign policy is formulated and applied which suggests to many that European countries must be brought into closer association in order to exercise the weight in international decisions which their total importance justifies. Some varieties of this school of thought toy still with the possibility of neutrality; but the importance of this view lessens.

The political motive merges with the first and most important of the economic pressures to integration. Most Europeans wish to end as soon as possible their dependence upon American aid. They are skeptical of their ability to balance payments with the dollar countries on a nation by

nation basis. They hope that improvement of productive efficiency from specialized production for the whole European market would make that possible. Many substitutes for American products might be brought down in cost and European export capacity in competition with American manufactures in third markets be enlarged. But to get European tariffs down, when every concession granted to a European must be extended to all countries with which the country granting the reduction has a trade agreement containing the most-favoured-nation clause, almost forbids the use of this method. Under the General Agreement on Trade and Tariffs an improvement has been made. Concessions are extended only to members of the agreement. As all members participate in the tariff bargaining sessions, each nation is forced to give adequate returns for all concessions from which it will benefit. However, at the recent GATT meeting in England, at Torquay, even this method produced slight results. This experience suggests to many Europeans that the most-favoured-nation method has about worked itself out. Negotiations limited to European countries without the obligation to extend concessions granted each other to non-European countries seem the only method of getting on with tariff reductions in Europe.

To the same end it is imperative that payments difficulties between the countries of Europe should not bring about another outbreak of bilateral payments arrangements. Such a retrograde step was avoided a year ago by the adoption of the European Payments Union. It has permitted a great trade expansion within Europe and with the overseas countries of the sterling area, and has vividly impressed Europeans with the virtues of currency convertibility over a wide area. In the absence of devices to cope with the early financial consequences of rearmament, together with some special economic difficulties of the German economy, additional burdens have fallen upon the E. P. U., threatening it with collapse. Greater monetary on financial cooperation between the members of the Union is required to save and improve it as an instrument for expanding European trade.

Rearmament itself seems to some members of the League to offer a golden opportunity to speed up European integration. Since European countries have always been faced hitherto with a number of possible enemies, it has been necessary for each nation to equip its own forces as far as possible from its own production. A large part of the resources of small nations has therefore had to be devoted to creating a number of small-scale manufacturing plants, each producing a variety of products. The consequent economic burden was crushing and the results too often inadequate.

Today west European countries are faced with a common enemy. It would therefore be possible to plan arms production in specialized plants

for the whole European market and to locate them where economic and strategic rather than purely nationalistic considerations dictate. Not only would the cost of rearmament be thereby much reduced, but the legacy of such planning would carry the European economy a long step forward toward integration. A European arms budget would also allow a better distribution of the cost. A European rearmament plan would also permit that interpenetration of the German and other European economic systems, which is an essential condition for the safe use of German manpower in the defence of western Europe.

Associated with this increasing emphasis on the necessity of a closer economic relationship amongst the countries of western Europe is a tendency to give more attention to the place which overseas countries should play in this closer association. It has always been hard to see good economic grounds for the view that to give the industries of a number of industrial countries access to each other's home markets would greatly increase the economic strength of the group. The cutting off of the industrial areas of western Europe from their former markets and sources of food and raw materials in countries now behind the Iron Curtain has greatly strengthened these doubts. European integration can only be effective in raising European productive power if it is carried out in association with overseas countries which may replace the lost markets of Eastern Europe. In short, Europe must restore the trading system of the nineteenth century.

In the last century, however, North and South America were perhaps the most important segments of the overseas world with which Europe traded. The rise of the industrial power of the United States has removed North, and probably also South, America from the areas with which Europe might re-establish such an economic relationship today. There remain, therefore, mainly Africa and southeast Asia, and in these areas the large countries are all members of the Commonwealth of Nations. Many of them, moreover, have already the closest of economic ties with the United Kingdom and this has led some to conclude, over-hastily perhaps, that the overseas Commonwealth countries would naturally follow Great Britain into closer economic cooperation with the countries of the continent. Two obstacles to such a movement are so significant, however, as to lead the government of the United Kingdom to offer its relationship to the other countries of the British preferential tariff system as a main reason for its reluctance to join the current movements for European unification. Not only do these overseas countries enjoy preferences in the British market for their foods and raw products which the agriculturally more self-dependent economies of the continent would hardly be willing to extend to them, but Britain in her turn enjoys preferences in their markets for her manufactured goods which she would be most reluctant to share with her industrial rivals on the continent.

There is another aspect of this matter which both Britain and the agricultural sectors of continental countries will have to consider. The extremely inflationary process of selling their raw products in British and west European markets for sterling or other currency balances is one which overseas countries cannot continue much longer. Southeast Asian countries in particular insist that they must have goods in return in much larger quantities. Indeed, they contend that consumer and capital goods are needed not only in the amounts which they could buy with their exports, but in much greater amounts, and that Europe will have both to find the goods and the capital to finance such sales if the flow of foods and raw materials to Europe is to go on. In other words, not only will the west European markets for the products of these overseas countries need to be enlarged, if necessary at the expense of competition with local farmers, but the whole of the industrial capacity of Europe will have to be drawn on to produce the goods required in return. Indeed, the argument may be carried further. There is little hope of the increased European savings from which a high level of capital exports might come unless the productive capacity and efficiency of European industry is raised beyond the levels attainable on the present restricted national bases. And that requires the merging of these national economies into one in which competition between manufacturing firms will improve efficiency ruthlessly.

It is obvious that the prospect of a long period of rearmament strengthens this argument. It increases our need for an expanding flow of raw materials especially from the underdeveloped countries. Moreover, our recent somewhat indiscriminate stockpiling of their commodities has so raised prices as to threaten the economies of the southeast Asian countries with a disrupting inflation. If these countries are to be persuaded not to try the very attractive alternatives which Communist propaganda offers, the flow of goods to them must be given top priority in the rearmament program. It will hardly be enough to keep them from starving and for the rest pay them in currency balances which depreciate in their hands because of the inflation which we are either unwilling or unable to control. So at least the argument ran.

A conspicuous feature of the conference was the success of the delegates from India, Pakistan, and Ceylon in convincing its members of the validity of this argument. As the conference proceeded less and less was heard of the early reply that rearmament must be given a production priority, that each nation must make its share of the sacrifices required by defence. In the resolutions passed at the preliminary London conference priority for capital and other goods for southeast Asian countries was given first place in the resolutions; at Brussels it gave place only to a resolution on the European Payments Union whose problems the European delegates had much on their minds.

The Brussels resolutions proceeded from this topic to underscore the

necessity for the participation of the United Kingdom in the movement for closer European economic cooperation. They saw no insuperable conflict between such action and a proper care for the interests of the Commonwealth, but affirmed that closer relations between Europe and Commonwealth countries overseas would be to the advantage of both.

By all odds the most difficult and contentious of the resolutions of these conferences were those which dealt with the trade policy aspect of the process of developing this closer European and overseas cooperation. The resolution finally adopted at Brussels accepted the view that the existing machinery of the General Agreement on Tariffs and Trade, under which the leading nations are trying to carry out the essential aims of the Havana Charter for an International Trade Organization, should be used in any negotiations to "free trade in Europe and with such Commonwealth countries as may wish to participate." The first of two provisos added to this general statement reaffirmed the intention to create no "closed or exclusive system" and to offer no impediment to the postwar progress of trade liberalization. All this affirmation of the innocence of European intentions was made necessary by the second proviso appended to the general intention to work through GATT. This intention was affirmed

> ". . . provided . . . that existing commitments on trade among Commonwealth countries and among other G.A.T.T. members should, by mutual negotiation amongst all concerned therewith, be made less inflexible so as to permit the establishment of more liberal trade arrangements in Europe and between those countries of Europe and the Commonwealth who so desire."

Like most expressions upon which compromise resolutions between contrasting points of view are built the key words "less inflexible" have the essential quality of vagueness. They permit a variety of interpretation according to one's ideas as to the source of the inflexibility complained of. At one extreme lie those who find the failures of the Torquay conference to be due to the most-favoured-nation clause. We have reached a stage where it is impossible, they contend, to make significant tariff reductions if bargains struck between pairs of countries must be extended to all other countries automatically under this clause. Europe can be integrated by tariff reductions only if the negotiating countries are freed from its obligations. Only in this way would adequate "flexibility" be achieved.

At the other extreme lie those who attribute the failure at Torquay to the resolute intention of the United Kingdom and some other Commonwealth countries to permit no further reduction in the British preferential tariff system, and their ability to do so because of the system of "bound margins" of preference. They think that greater flexibility will have to be introduced into the British preferential system by further negotiation amongst its members before they will find it possible to offer to other countries an important list of tariff items on which they are in a

position to negotiate. Once that has been done, bargaining with all the members of the GATT organization may be resumed with some chance of success.

To most members of the conferences, however, the suggestion that current tariff negotiating procedure should be given greater "flexibility" is bound to bring to mind a modification of the most-favoured-nation clause. Since the purpose of any such modification would be to widen the possibilities of discriminatory reductions in tariffs, and since this runs flatly against one of the cardinal elements in the commercial policy principles to which the nations have solemnly pledged themselves in recent years, one may well wonder how sufficient support for such a resolution was obtained.

The continental European members of the European League for Economic Co-operation are such enthusiasts for the cause that they would have little hesitation in throwing any policy which promises to hinder it into the melting pot. A wing of the British section of this organization is made up of British imperialists of the Joseph Chamberlain tradition who have never had any love for the most-favoured-nation clause. Other Conservative politicians who are prominent in the European League for Economic Co-operation would find their political position in Great Britain immensely eased if the British people could be convinced that the Labour party argument that closer relations with Europe involves weaker ties with the Commonwealth was not valid.

Still other members of the British section of the League are enthusiasts for the idea of European integration largely on grounds of high international politics. Probably a majority of the British people still stand by the traditional foreign policy of preventing the unification of Europe under any continental power. The enthusiasts in the League contend that the rise of Russia makes that policy bankrupt. Europe will be unified, they think. The only question is whether it will be unified forcibly by Russia, or perhaps by Russia and Germany in alliance, or peaceably as a vital and viable part of the free world. To prevent the resurrection of Germany as a military power the West German economy must be so inter-mixed with that of other European nations as to make the waging of war by any one of them alone impossible. The European members of the League, including the members of the German section, share this view. And finally, all members of the League are determined to see Europe stand on its own feet economically as soon as possible; they do not think that is possible except by unification. If Europe is to survive as more than a pensioner of the United States, Europeans must push for unification with all possible energy. If international policy appears to stand in its way, the modification of that policy must be immediately considered.

India, Pakistan, and Ceylon have the most direct interest in any course

of action which seems likely to expand Europe's productive capacity and the flow of goods in their direction. Nor are they averse to engaging in any preferential tariff arrangements designed to aid that development. After all, it was mainly at their insistence that wide-ranging exceptions to the rule of nondiscriminatory tariffs had been included in the charter of the proposed International Trade Organization.

Australia, Canada, New Zealand, and South Africa expressed surprisingly similar views. They were disturbed at the power of those forces in Europe urging her people to seek stability through monopolistic and restrictive arrangements and were most anxious to support any proposals designed to enlarge the opportunities for individual enterprise and to create a viable European economy. To that end they were willing to continue the modification of the British preferential tariff system as might seem desirable. But they set their faces unitedly time after time during the discussions against any tendency to create in Europe an economic bloc directed primarily against the United States.

That the Canadians present were, of all the Dominions' representatives, perhaps the most insistent upon this position, is not unnatural. Historically we have used the sterling proceeds of an extended overseas commerce to pay for an excess of imports from the United States. The fall of the value of sterling made that form of multilateral trade a less attractive one during the interwar period; the gradual increase in the severity of dollar exchange controls has reduced it now almost to insignificance. The state of the Canadian economy in the face of this change would have been sad indeed had not a new American tariff policy and the rising purchasing power of the American market together made it possible for us to shift from an overseas to an American base.

We should like to sell still more than we do in the United States; but to diversify the supports upon which the Canadian economy rests we should like also to revive and expand our overseas trade. To that end Canadians have most enthusiastically supported the efforts of the nations to move to freer and nondiscriminatory trade and to exchanges which were both stable and convertible; we have been specially appreciative of American leadership in that endeavour.

The propaganda of cartel-minded Europeans against this policy and in favour of an exclusive, non-dollar trading bloc would have little chance of success were it not for the very widespread conviction amongst Europeans that a multilateral trading world in which the United States is the dominant partner (as it must be in any group to which it belongs) would not be stable enough to satisfy Europe's necessities. Socialists would find their power to achieve domestic plans too greatly limited by disturbances arising outside their economy; freer economies might not, under the impact of such external disturbances, be able to keep near enough to full employ-

ment and welfare targets to offer to their people an attractive alternative to socialism or communism. Behind all the talk of the dollar shortage the concern is as much with its variations as with its absolute size. Even if they were to agree with the present optimistic view that the shortage is likely soon to become unimportant the fears of Europeans would not be greatly allayed.

Perhaps Canadians may someday be in for a rude awakening, but for the moment they persist in what Europeans think a most unrealistic optimism about the probable course of business and the national income in the United States. Opinion in all circles in the United States, including supposedly very conservative ones, has changed radically since 1929 on the role of government in the American economy. Moreover, the actual weight of government amongst the factors determining the national income of the United States has so increased that, no matter what the climate of opinion might be, the American economy could not again behave as it did in the early 1930's.

But a much more important source of some Canadian skepticism of the benefits to Europe of the proposed integration lies in doubt that Europe or any other region has in fact the power to insulate itself from the impact of the future fluctuations of the American economy. Imports may be reduced promptly by quantitative or similar restrictions. But, unless exports to the United States have already been reduced to a very low level indeed, the tendency of imports in the United States to fall very rapidly as the national income declines must at once reduce one of the most important income-creating factors in every foreign country. Moreover, economies in which the foreign sector is much more important than it is in the United States are seriously limited in their power to maintain the national income by domestic action in the face of large losses in export income. Since Canada has suffered severely in the past from the variability both of the level of business in the United States and from the nature of its tariff policies, Canadians may be too sensitive on this score. But one doubts, on the basis of that experience, whether Europeans will be able to do anything like the "insulating" job they seem to think they can.

But skepticism concerning the whole project for the creation of a European economy has a still firmer foundation. As the resolutions of the Brussels conferences themselves clearly implied, the defense of the free world demands of all nations the closest cooperation with the United States. Through the North Atlantic Treaty organizations the conference hoped that the military and financial aspects of rearmament might be so managed as to promote European integration and the European Payments Union by which its present degree of multilateral trade is being maintained. The resolutions also urged upon the countries of Europe the

strictest monetary and fiscal discipline to minimize inflationary tendencies inherent in rearmament. It is also true that the success of that rearming effort depends upon as full an exploitation of international specialization as can be achieved. Trade must flow between the nations at as high levels as possible. Surely this is hardly the time then to disturb the international scene by reopening difficult questions of international commercial policy.

Why then, you may ask, did the Dominions, and particularly the Canadians, assent to conference resolutions which suggested that such problems be reopened? You will recall that the need for two different sorts of flexibility was urged upon the conference. The upshot of the Torquay tariff bargaining within the framework of the General Agreement on Tariffs and Trade indicated that the Dominions participating could make no further progress till some of the rigidities within the British preferential tariff system, particularly the "bound" preference margins, were eased. Others urged that the most-favoured-nation clause, which was still being applied within the group of members of GATT as an essential aspect of their bargaining procedure, must be abandoned before the European members could make progress toward a free trade area of their own.

At the London conference, largely at the Dominions' insistence, the resolution of trade policy said simply, "The Commonwealth representatives express their willingness and desire to stimulate trade between Europe and the Commonwealth by a further liberalization of tariffs within the framework of GATT." This form of words effectively blocked consideration of the modification of the most-favoured-nation clause while leaving the members of the British preferential system free to introduce greater flexibility. In any negotiations between themselves which the European countries might wish to begin they would meet still the inflexible, most-favoured-nation clause. It was largely at their insistence, therefore, that the Brussels resolution was expanded to include a recommendation for less inflexible commitments amongst both the members of the Commonwealth and the members of the General Agreement on Tariffs and Trade. In the light of the strong opinions of many of the Europeans present at the conference it seemed wise that even during the rearmament phase these matters should be looked at afresh.

Though it never appeared in the proceedings of the conference, there was in the minds of some of its members, including some of those from the Dominions, a point of view which made it easier for them to agree to this compromise resolution. The alternative program to tariff negotiations looking to freer trade relations within regions is to continue with the program outlined at the end of the war. Two lines of advance toward the multilateral trading world with low and nondiscriminatory tariffs were then laid down. On the one hand, as soon as its production recovery had gone far enough and its balance of payments situation made it possible,

each country would do away with its exchange controls and make its currency convertible into the United States dollar. Under the International Monetary Fund agreement the nations are going to be faced with this obligation when the transition period ends in 1952. The other line of advance was to be a long series of tariff negotiations amongst the members of GATT for the reduction of tariffs on a nondiscriminatory basis by the use of the most-favoured-nation principle.

On neither of these lines of advance has progress been all that was hoped and prospects seem to worsen. Substantial reductions in tariffs have been made but the chances of further progress seem not too promising. In 1947 Great Britain, according to the special obligations assumed in the Anglo-American Financial Agreement of 1945, made the pound sterling convertible into the dollar but had shortly to end the attempt at convertibility. This unfortunate experience may long delay a second attempt. In short, as tariff reductions get down to levels where further cuts hurt, as the time for a decision on convertibility approaches, the nations begin to recoil.

This natural reaction of cautious politicians and administrators, together with the pressures of vested interests, would not be so serious were it not for a general skepticism about the wisdom of attempting to restore a world-wide multilateral trading system with universal stability and convertibility of currencies and free trade or low and nondiscriminatory tariffs. One suspects that this view was widely enough spread amongst the delegates to the Brussels conference to make them less than adamant against the suggestion that the relevance of these objectives to such problems as Europe is concerned with, be reconsidered.

After all, free trade and stable, freely-convertible exchanges are not ends in themselves. In the nineteenth century they were but aspects of a total economic policy designed to give as free a field as possible to the system of private capitalism. Despite occasional lapses from the obligations of the gold standard or high tariff aberrations from the free trade ideal, that total policy met the assent of all nations; it was the economic policy by which all the members of the nineteenth century international economic system sought to guide their actions. Today nationalism rules in economic policy-making. Governments actively set the framework for economic activity within their borders and support a wide variety of economic systems. The purposes which they hope these systems will serve vary also from nation to nation. They have no longer the neat simplicity of nineteenth century aims. About the only way that such diversities could be brought to the degree of uniformity of policy required to make an international free-trading system succeed in advancing human welfare as it did in the last century is by force of arms or the persuading pressure of a dominating economic power. We are engaged in resisting forcible unification and one

doubts whether the American people are really willing consciously to apply the pressure required.

It may well be, moreover, that the drive for the unification of Europe arises from a misreading of the lessons of the past. Europeans seem to be pursuing economic integration under the illusion that it alone would do for them in the second half of this century what it took complete political unification to do for the United States in the nineteenth cenury. It may also be that we North Americans, in adopting as our objectives in the late twentieth century, instruments of policy lifted from their context in a successful nineteenth century system, are also guilty of a grave misreading of history. We shall need, I think, a "less inflexible" (to quote the key words of the Brussels conference resolution on trade policy) approach to the complex problems of recreating an international economic system, if we are to build the new world wisely and well.

IMPACT OF DEFENSE PROGRAMS ON THE ECONOMICS OF THE UNITED STATES AND CANADA

CHAIRMAN: H. VAN VLIET
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POLICY LESSONS FROM THE ECONOMIC MOBILIZATION OF THE UNITED STATES*

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THE economy of the United States has been put through a kind of fire drill during the past year. This drill has come off much better than might have been expected when one takes account of the awkward political division, the doubts and debates about foreign policy that have prevailed, along with the decentralization that characterizes our political and economic institutions. We shall agree, I am sure, that the performance has been surprisingly good in view of these rather difficult and trying circumstances. Mistakes have been made, of course; some by private individuals in overstocking the larder and in bidding raw materials too high, and some by public agencies in holding on to cheap money too long and in stockpiling too quickly. From the high ground of retrospection, we can readily look back and see the kind of a drill we have put on. What can we learn from this brief experience at economic mobilization?

I shall consider mainly measures intended to bring the economy into a state of readiness to provide on short notice the materials required for an all-out war, should this unfortunate contingency arise. This objective is very different from that of other mobilizations in the history of the United States. We have never had occasion to become mobilized and stay prepared. We are now engaged in accumulating raw materials, building plants, and developing an organization to be held largely on a stand-by basis ready to produce the armament and related goods required for war. The objective, as I see it, is not and should not be primarily that of producing for a short period a large stock of war materials to arm our military services and to make arms available to the European countries who are joining us in this effort. The basic task is rather one of developing the industries of the United States, Canada, and of these European countries so that the required flow of war materials can be expanded very rapidly should it become necessary to do so. It is my belief, which will of course affect the appraisal that follows, that the existing international tensions

* University of Chicago Office of Agricultural Economics Research Paper No. 5123.

are of such a nature that we must become and stay prepared for the foreseeable future, which may turn out to be for many years to come.

In this paper I shall endeavor to do two things: (I) examine briefly the economic experiences of the United States as an effort at mobilization since late June, 1950; and (II), consider the more important difficulties that appear to confront us in achieving and maintaining a state of economic readiness for war.

I. *1950-51 Economic Mobilization in Retrospect*

Appropriations for the armed services have exceeded expenditures. But the hump in the buildup in military claims on the economy has not come nearly as soon as was commonly expected. This hump did not materialize in the late fall as was at first anticipated; nor did it come during the winter; spring came and so has summer and still no hump. Will it put in its appearance in late fall as now expected? Or is this hump under existing conditions a conceptual illusion? I suspect we shall find that the U. S. economy has sufficient flexibility to make with remarkable ease a transformation of the kind implied by present appropriations to the Armed Services and by the timetable set by the Pentagon, as it has done to date, and appears likely to do in the months immediately ahead. We have, as I see it, substantially overestimated the difficulties of transformation. The economy has taken the new assignment in its stride, an achievement which may be ascribed to the underlying health and strength of the economy as of mid-1950, or to the economic policies that were adopted, or to the combination of the two.

We need to look into these matters in somewhat more detail at this point to bring into focus particular policies and programs. I shall consider, first, the conventional foci of public management as seen by economists, namely: fiscal, monetary, and wage-price controls.

A. *Fiscal.* The United States deserves a high score on its fiscal achievements during the past year. The federal budget was anything but static. Changes in both expenditures and revenue bespeak a remarkable fiscal flexibility. Hard as it is in our political system to increase taxes to compensate, in this instance, for greatly increased appropriations to the armed services, the Federal Government, in fact, closed the year which ended June 30 with cash receipts of over five billion dollars in excess of expenditures. You will recall that Congress imposed higher taxes, and rather promptly, by our standards, following the burst in military appropriations. It should also be noted that some large items in the budget, for example the appropriation for agriculture, turned out to be much less than estimated when the budget was proposed. Necessarily there has been a lag between military appropriations and the placing of orders and between these and deliveries. Then, too, the large rise in dollar incomes of corpora-

tions and of individuals has increased sharply the flow of revenue into the Treasury.

Clearly, in fiscal policy the United States is on even firmer ground than this description of the budgetary outcome of the past year may suggest. We have come a long way in understanding the role of fiscal measures in achieving economic stability. This understanding is not restricted to economists and their technical journals, but it is sufficiently widespread to make it a meaningful factor in policy making in government. All of the major interest groups are aware of the importance of fiscal controls. In the business community, there are the outstanding contributions of the C.E.D.; fiscal policy is well understood by those who speak for agriculture; labor leaders are also informed and take a positive position in the use of these measures. It would be interesting and, I believe, very valuable to know how we have come to this useful understanding of economic policy in this particular sphere. What in our experience and education has given us this insight and maturity?

B. *Monetary.* In monetary management, the United States has come off badly. It deserves a very low score, for it certainly failed the first part of the test. Had the Federal Reserve and the Treasury set out in June, 1950 not only to permit but actively to induce an inflation, they could not have done better. Between May, 1950 and May, 1951, Reserve Bank credit outstanding rose from 17.9 billion dollars to 23.7 billions. This rise of 5.8 billions may be compared with less than half that amount in total Federal Reserve credit prior to World War II (for example, 2.4 billions at the end of 1940). What happened was that the Federal Reserve found itself embedded in a Treasury policy which made it necessary for the Federal Reserve to buy about five billions of government securities to support the market of these securities at the level at which they had been pegged by the Treasury. Member bank reserve "balances" rose from 15.8 billions in May, 1950 to a peak of 19 billions in February and March, 1951. They have been reduced slightly since then. This very large increase in reserve balance set the stage for a rise in bank loans of about 12 billion dollars. The record reads like a perfectly planned inflation.

It should be said, however, that once the Secretary of the Treasury was induced to forego his pegged bonds and cheap money, and the Federal Reserve was given some freedom in monetary management, the transition was made, so it would appear, with unusual technical skill. By early spring, government securities were brought into contact with the market, thus lifting from the Federal Reserve the burden of supporting these securities substantially above the market as it had been doing. But unfortunately, the damage had been done. The strong anti-inflationary fiscal policy of the Government had been nullified. The United States had been treated to a large dose of monetary inflation.

It should be clear from this and other recent experiences that monetary controls are not understood well enough to give us a public process for using them effectively. The difficulties are, I believe, rather deep-seated. There is much confusion with regard to the possibilities and the proper uses of monetary controls, not only among public leaders, but also among economists. There continues to exist all too much doctrine on this matter among economists; some are disposed to belittle and some to claim too much for these instruments. Because these controls proved to be of little use in counteracting the deflationary conditions of the early thirties, they became discredited and were long neglected.

The quality of the arguments presented at Congressional Hearings on this subject has declined greatly since the early twenties. It is only very recently, under the strong leadership of Senator Douglas, that there has been a "rediscovery" of the functions of monetary management. However, as yet there are only a few individuals in government who understand the intricacies of monetary controls. And the same can be said of other public leaders. For example, in business, where the C.E.D. has done yeoman work on economic policy, no really meaningful policy statement has emerged on monetary management. Labor is also confused in wanting both less inflation and cheaper money. In agriculture we find a notable exception, where most of the leadership has shown an unusually clear understanding of these instruments of economic policy. Here again, I wish we knew more about the role of education and experience in shaping public understanding of these particular controls.

C. *Wage and Price Controls.* I find it very hard to discern how well or how badly we have done in this area of economic policy. Moreover, I feel that I am quite unqualified to judge, because of my strong belief that these particular controls have not been appropriate to the circumstances that have existed during the past year. As I read the indicators, we have very little suppressed inflation in the consumer sectors of the economy. Both product and factor prices are quite free and in relatively satisfactory adjustment. The controls in these sectors have been and are for the most part nominal. They undoubtedly have served some political purposes. But their economic effects upon the allocation of resources and the distribution of personal incomes have been, I believe, very small.

I shall now turn to the 1950-51 achievements in production. It will be my thesis that the realized production has been much better both in volume and in composition (military and civilian) than was expected a year ago.

As mobilization got under way after the Korean invasion, the U. S. economy had already recovered from the slump of 1949 and appeared to be essentially in full gear. Therefore, it was generally held that although some additional production would be forthcoming from a further reduc-

tion of unemployment, a longer work week, and from normal economic growth, a rapid expansion of the Armed Services and of war materials could come about only by a very substantial contraction of the production for and the flow of goods and services to civilians. Total output appears, however, to have increased much more than this expectation implies. Where have the additional inputs come from? As yet no satisfactory explanation is at hand.

A few figures may be helpful: From April, 1950 to April, 1951, industrial production as a whole rose over 17 percent; durable manufactures by nearly 25 percent; more specifically, iron and steel is up about 20 percent; machinery, 34 percent; cement by almost as much. The output of petroleum and coal products and that of industrial chemicals are 24 percent larger than a year ago. Construction materials are up about 20 percent, with private industrial and commercial buildings and public construction in the vanguard. Meanwhile, I assume, we have been accumulating stocks of some important raw materials both by private firms and public agencies. We can only repeat the question: Where have the additional inputs which have made this large rise in production and in stocks possible come from? Have they come from the expansion in industrial plants and related capital inputs of the past several years? Has a substantial part come from the additional factors of production acquired from abroad? If it has been the latter, it can hardly continue, in view of the acute shortages in stocks in parts of industrial Europe and elsewhere.

As I read the 1950-51 record, it indicates a larger aggregate production than might have been expected and an easy and rapid transformation in building plants and producing matériel for the Armed Services. Civilians have come off well in the flow of goods available to them and so has the Pentagon, considering the orders let and the timetable set. Public economic management did exceedingly well in the fiscal area but failed in the monetary. The mistaken monetary policy was not corrected until well into the first quarter of 1951. Wage and price controls in the consumer sectors imposed during the year appear to have been largely nominal.

II. *Difficulties in Economic Mobilization in Prospect*

I shall assume the objective is not only to achieve but also to maintain a state of economic readiness for war. Suppose the international situation continues to be such that a major war is averted, but that we must for some years to come be ready for such a drastic contingency; and suppose, further, that it will require between 10 and 20 percent of the national product to attain this objective. Under these circumstances, what major difficulties are likely to arise in managing the U. S. economy?

The difficulties that will arise are primarily matters pertaining to politi-

cal and economic organization, as I shall endeavor to show in considering the five questions that follow.

A. Will a mobilization effort requiring 10 to 20 percent of the national product place the economy under a severe strain? Without stopping to define "strain" in this context except to relate it to per capita real income available for consumption, the answer is clearly No—provided we can maintain economic growth.

B. Are we entering fiscal 1952 (that is, year beginning July 1, 1951) with major maladjustments in the way resources are being employed and with very considerable suppressed inflation in the system? A strong case can be made for the negative on this question. The U. S. economy is at the moment well balanced; it is in process of meeting both civilian and military requirements in the proportion indicated by our public objectives; factor and product prices are in general in line with this assignment, although the inflation generated by World War II and that permitted by the monetary authorities during the past year have impaired rather seriously the incomes of some groups in the community.

C. Are fiscal and monetary controls sufficient to maintain a workable degree of economic stability? Take, first, the expansion phase during which orders from and deliveries to the Pentagon are on the rise. Here the answer falls into two parts. (1) In principle these particular controls are fully sufficient for the task indicated; and (2) in practice, however, the public process, the Government, and those agencies charged with the management of these controls are likely to apply them very imperfectly. (Page the record of the Treasury from June, 1950 to about March, 1951!) The difficulty, nevertheless, runs much deeper than the mere obtuseness or the inability of those who are responsible for fiscal and monetary management in Washington. It is the lack of public understanding, leaving economists aside, especially of the function of the monetary instruments, which is the real limitational factor in practice and is likely to be so for years to come. Once the expansion phase is over, the task will become much harder because the changes in the flow of appropriations and in orders may create major economic disturbances. I shall now turn to that issue.

D. Will appropriations to the Armed Services and orders from the Pentagon for plants and goods and the timetables set for their construction and delivery be such as to induce economic uncertainty of major importance? It is hard to believe that the answer can be other than in the affirmative. Here we have, as I see the prospects, a fundamental difficulty hard to avert, given our history and institutions, and hard to cope with in an economy as decentralized as ours. The difficulty consists of two basic problems suggested by the terms "appropriations" and "orders." There is no assurance that either the flow of appropriations or of orders can or

will be so managed that economic mobilization and staying ready will not become a major source of uncertainty having serious adverse effects upon the economy.

Take first the flow of appropriations. Will they permit long range plans? Certainly not. The United States does not have a well established, settled foreign policy to guide it through the international tensions and the struggle for power that appear to lie ahead. It has had no experience at economic mobilization where the objective is to become and to remain ready for the contingency of a major war. Not having these, we cannot expect Congress and the Executive to provide a steady and dependable flow of appropriations. I do not wish to imply that these appropriations should not be altered as international and other circumstances change. These changes in the state of politics among nations may in themselves be sufficient to create much continuous economic uncertainty as appropriations are adjusted accordingly. But in addition to these international circumstances, we must take account of the way in which American political institutions work. And in this case, the magnitude of the appropriations is so large that it has become the single most important variable in the economy.

Let us take next the Pentagon as a management agency which allocates the funds that have been appropriated and uses, say, 10 to 20 percent of the national product. Can and will this agency so schedule its orders for plants and for goods that they will not induce economic uncertainty? The odds are that, even if the flow of appropriations were entirely neutral on this score, the Pentagon will become the source of much economic uncertainty. A part of this cannot be averted, because of technical advances in military equipment and of changes in the art of war. Another part will stem from particular elements of flexibility in military programming which are desired and obtained by imposing some uncertainty upon the economy. There exists a third part of major importance which will arise out of two circumstances, namely (1) the unawareness of the Pentagon of the effects of changes in the flow of its orders upon the stability of the economy and (2) the sheer magnitude of the task of integrating and managing so large and so complex an undertaking.

E. There is still another major difficulty suggested by this query: Is it possible for the Pentagon to allocate the resources which are made available to it by congressional appropriation in accordance with the maximizing principle of economics? The answer is clearly, Yes. But this is not what happens. In peace time our Armed Services have been "starved" and in war they have been "overfed" with appropriations and claims on resources—not the kinds of diets that nurture a healthy respect for the principles of economy. Existing circumstances, however, require a profound change in procedure. The Armed Services have become and may

continue to be a major sector of the economy, as will be the case if they employ from 10 to 20 percent of the national product. It would be a miracle if the malallocation in resources within the Armed Services were not numerous and large in the aggregate, given our history, experiences, and the existing organization of procurement and allocation of materials for the Armed Services. We need very much to develop in economics an applied branch setting forth the principles and rules for military economics. This analytical effort should concentrate mainly upon the conditions that must be met to establish a military organization which will have substantial self-correcting capacities in reducing and in eliminating malallocations in resources within the Armed Services.

The difficulties ahead in becoming and staying ready for the contingency of a major war should not be minimized. The Pentagon must sooner or later learn and apply the principles of economy in its own sphere of activities. The flow of military appropriations and orders, once the expansion phase is over, is likely to become a major source of economic uncertainty for the rest of the economy. Here we have a new potent engine for economic instability. During the expansion phase, fiscal and monetary management would be sufficient, provided we use them appropriately. In relying on these controls, we shall have more of the kind of flexibility that is required for economic growth. Given substantial growth, the drain on civilians of a mobilization effort that employs 10 to 20 percent of the national product should not become a major problem.

THE IMPACT OF THE DEFENSE PROGRAM ON THE CANADIAN ECONOMY

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THE Canadian economy has proceeded not more than half-way in the application of resources toward the objectives of the defense program.[1] In certain phases, particularly in the rate of procurement of equipment and installations, it is less than half-way. The expansion that has taken place is largely in that sector which least disturbs the civilian part of the economy.[2] Hence, while some things can be learned from our experience to date, it is not sufficiently broad to make firm generalizations about the final impact of the program. Rather, one must attempt to draw conclusions from the nature and extent of the proposed program and experience elsewhere.

This program is being expanded rapidly in an economy that is already operating at a high level, such a level in fact, that the cost of living index rose steadily by 7.5 percent from last December to June, and wholesale prices rose by nearly a like amount between December and May, though levelling off in the last three months. At the same time unemployment, allowing for seasonal factors, was at near record lows.[3]

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[1] For general background on magnitudes in the Canadian Economy the following are given: Population, 14 million; labour force including Armed Forces, 5.3 million approximately; gross national product in 1950, 17.8 billion dollars; national income, 14.3 billion; total public expenditure of all governments, including transfer payments to the general public but not from Federal to other governments in calendar year 1950, 3,850 million dollars; total current account debits plus credits on international account in 1950, 8.8 billion dollars.

[2] Defense contracts let in the fiscal year ending March 31, 1951 were roughly 800 million dollars according to a statement of the Minister of National Defense as reported in *House of Commons Debates*, Official Report, Tuesday, May 8, 1951 (Ottawa, King's Printer), p. 2803; additional contracts in large amounts have been let since March 31. Defense expenditure (excluding special expenditures, largely made up of transfer, out of inventory, of equipment to N.A.T.O. countries) appears to have been about 311 million dollars in the first five months of 1951; this figure is based upon information in monthly treasury statements, reported in Dominion Bureau of Statistics, Ottawa, *Canadian Statistical Review*, and the *Canada Gazette* (King's Printer, Ottawa), upon information given in *Estimates for the Fiscal Year Ending March 31, 1952* (Ottawa, King's Printer) and information in the statement of the Minister of National Defense, referred to above.

A statement in July, 1951 placed the numbers in the Armed Forces at 81,000 (*Kingston Whig-Standard*, Kingston, Ontario, July 18, 1951); the ultimate objective is 115,000 or more (House of Commons Debates, Feb. 5, 1951, pp. 96-97 and May 8, 1951 p. 2797 ff.). In addition there are to be 33,000 civilian employees in the Defense Department.

[3] Unemployed for the week ending March 3, 1951 numbered 172,000 out of a *civilian* labour force of 5,172,000; Dominion Bureau of Statistics, *The Labour Force, Quarterly Survey, Week Ended March 3, 1951*. At this time of the year seasonal unemployment is high.

Into this economy a defense program that will probably ultimately absorb between 10 and 15 percent of Gross National Product, as compared with three to four percent in 1950, somewhat more than two percent in 1949 (and nearly 50 percent at the height of World War II), is being grafted.[4] It is the purpose of this paper to hazard some guess as to the impact of this program.

The remarks in the main are directed toward developments in the next four to five years. They are based on the assumption that the course of international events and the temper of the Canadian people will be such that the announced program will be maintained throughout that period. First, the production potential compatible with our economic and political institutions is examined and its bearing on the defense and civilian sectors of the economy is indicated. There follows a discussion of present and implied future public policy designed to achieve public objectives in an orderly and efficient way. Finally, a short section is devoted to the effects of the defense program on the Canadian international economic situation.

The Production Potential and Defense Requirements

From a purely physical viewpoint of bearing on resources, the program involved should prove to be only a temporary burden in an expanding economy. Since we are interested in a period of some duration an examination of the factors of growth is worth some time.

(1) *The Labour Force.* On a number of counts a considerable, economically achievable increase in the labour force can take place. Contraction connected with retirement of those people who would normally not have been in the labour force but who had entered during the war seems to have been completed, and we now might expect no further change or perhaps even a moderate expansion on this score.[5] The labour force grows from natural increase by well over one percent per year and immigration this year will possibly expand it by nearly a like amount. The length of the working day declined by nearly five percent from 1945 to 1949 but in 1950 tended to increase slightly; it might be expected that in a period of pressure on real consumable income the recent increase would be maintained.[6] In all the circumstances that exist, and assuming a

[4] The Canadian Government has announced a program of over five billion dollars expenditure over the next three years, the estimates being presumably at the current price level, *House of Commons Debates,* Feb. 5, 1951, p. 91. This is probably a minimum figure and does not include private capital outlay for defense production. For the fiscal year ending March 31, 1952, estimated expenditure is 1.65 billion.

[5] For instance, the March 1951 survey of the Labour Force showed some increase in the proportion of women aged 24 and under in the Labour Force. Dominion Bureau of Statistics, *The Labour Force, Quarterly Survey,* Week Ended March 3, 1951, p. 6.

[6] Immigration into Canada was slightly over 60,000 in the first five months of 1951; a figure for the entire year of between 100 and 150 thousand immigrants is

continuation of immigration, a potential expansion in the effective labour force of more than two percent per annum is indicated. This rate of expansion not only adds manpower resources, but also provides an element of flexibility to a population that is already mobile in response to economic opportunity.

(2) *Capital and Natural Resources.* In the years since the war, capital facilities have been and are being expanded rapidly; since the completion of the conversion from wartime activity around 1947, gross domestic capital formation (excluding inventory increase) has been running at approximately 20 percent of gross national product.[7] While figures on the capital stock at the end of the war are not available to give an accurate basis of judgment, the addition to the total capital stock in recent years must have run at a very considerable proportion of the stock in 1945. For instance, in manufacturing, a guess would be that from 1946 to 1950 capital additions have amounted to at least 20 percent and perhaps as much as 40 percent of the previously existing facilities.[8] In the resource field, there are, as well as the usual rate of development, two major additions that perhaps may be called discoveries; these are oil in Alberta and iron ore in Quebec and Labrador.

There is reason to believe that many of the fruits of the expansion have yet to be realized in the form of higher current output. It takes time, in a program of growth at the rate that has existed, for capital facilities to be operated at their full efficiency; labour and management alike have new skills and new techniques of organization to learn. And certainly, in the case of oil, the present year will be the first to achieve really substantial results in an output that should continue to grow. On the other hand, the iron ore from the new deposits will not flow in large amounts for three or four years.

(3) Another factor of considerable importance at present in easing the load on domestic resources is a current very considerable net inflow of capital. Last year, for the first time in 17 years, a deficit on international current account was realized; amounting to 300 million dollars, it was equal to nearly 10 percent of private domestic investment in housing,

officially contemplated. (Statement of the Minister of Citizenship and Immigration reported in *House of Commons Debates*, Tuesday, June 28, 1951, p. 4860 ff.)

For average hours of work in manufacturing, mining, and construction see D.B.S. *Canadian Statistical Review*, monthly, e.g., June 1951, p. 19.

[7] Canadian national income and expenditure are given in D.B.S. *National Accounts, Income and Expenditure*, published annually.

[8] In addition, there are other difficulties in measuring the relative change in the capital stock such as are involved in the determination of the prices at which the original capital stock is valued and proper deflation of additions. Figures on fixed capital annual additions, and depreciation, for corporations are given in Department of National Revenue, Taxation Division, *Taxation Statistics*, now being published annually. Annual outlays and depreciation are also given in D.B.S. *National Accounts*.

plant, and equipment. The net capital movement conceals the fact that Canadian holdings of gold and dollar exchange increased by more than 600 million dollars during the year so that the net capital inflow on non-currency account, practically all of which was from the United States, was roughly 900 million dollars.[9] In the first five months of 1951, the net debit on merchandise account alone has amounted to just under 300 million dollars compared with an almost even balance in 1950.[10] This may not be fully indicative of what will happen in the full year, yet the current account deficit is apt to be large. For while exports will bulge toward the year-end if a good crop of high quality is realized and though some of the importing may have been in anticipation of shortages, there will be a considerable amount of procurement of military equipment in the United States to add to private purchases. It seems quite conceivable that the net debit on merchandise amount may rise to between 450 and 600 million dollars and there will be another 300 million dollars on non-merchandise account. Some of the capital inflow last year was undoubtedly largely in anticipation of the appreciation of the exchange rate which was freed in the late autumn. However, a voluntary inflow appears to be continuing, for while no direct data on capital movements this year are available, our current account debit has not been financed to any significant extent out of the official holdings of gold and U. S. dollars which comprise the bulk of Canadian dollar exchange.[11]

It is somewhat difficult to appraise the rate at which the capital inflow may continue over a period of years. A substantial part is made up of direct investment and this might be expected to continue.[12] A substantial part, however, has been in Canadian government securities of domestic issue; this part may be attracted in some degree by the differential in Canadian and U. S. interest rates and in some degree by the current (low) exchange rate.[13] It is highly probable that the differential in interest rates will continue. And while the level of the exchange rate may be an important factor during short periods of uncertainty, when major changes are anticipated, there is doubt whether it is the predominating factor in

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[9] D.B.S. *The Canadian Balance of International Payments*, published annually.

[10] See Bank of Canada, *Statistical Summary*, June, 1951 for trade figures for the first five months of 1951.

[11] Ibid.

[12] Out of a total capital movement from the United States to Canada of 951 million dollars (excluding changes in official liquid reserves) in 1950, net sales of outstanding issues accounted for 363 million dollars, direct investment 167 million and "other net private capital inflows including errors and omissions" 243 million (D.B.S., *The Canadian Balance of Payments*, 1951, p. 11).

[13] For a comparison of U. S. and Canadian interest rates on government bonds see Bank of Canada, *op. cit.*, p. 97.

the longer run, for American capital has been coming into Canada in large amounts since 1947.[14]

As noted in somewhat more detail later, the current account position may be expected to improve somewhat from the present in the next two or three years unless there is a substantial appreciation in the exchange rate, or Canadian prices should rise relative to other prices. Assuming that the latter does not happen, capital inflows at the current rate associated with a tendency toward a smaller current account debit would lead to an improvement in the exchange rate, unless the exchange reserves are increased. This would tend to cause a somewhat smaller, though probably still substantial, capital inflow.

This capital inflow, associated as it is with a net inflow of goods and services, will help to ease the burden of the defense effort on the Canadian economy to a very considerable extent. And even in the longer run, insofar as the capital inflow is reflected in greater domestic investment, it will lead to a net gain in the Canadian economy in excess of the earnings on the capital.[15]

(4) Brief reference to one additional factor of expansion should be made. As nearly as can be seen, productivity per man-hour on an average has increased for some time at roughly two percent per year. In the absence of the defense program, a continuation of this trend at even higher rates might have been expected for a while, as the enlarged capital equipment and new resources become used more efficiently. In addition to improvement in each industry some movement of the labour force from low productivity to high product industries is possible. In agriculture, particularly on the prairies, the results of the phenomenal mechanization of the last few years are being reflected in a decline in the number of males employed. And the defense program itself, if there is some relative easing in consumer expenditure, as may be expected with higher taxes and tighter consumer credit, may cause some relative shift from lower productivity service and distributing activity to higher productivity industries. That expansion in the latter is possible appears to be demonstrated in current increases in output beyond what was commonly expected with existing facilities.[16] However, at the same time, the intro-

[14] From 1947 to 1949 net noncurrency capital inflows from the United States were more than offset by capital outflows to other areas largely on official account or by changes in official holdings of dollar exchange and gold.

[15] A capital inflow, resulting in real capital formation, may increase income in the recipient country by more than the amount paid the investors for two reasons: (1) In Canada a withholding tax is levied on dividend and interest payments abroad, and of course income taxes are levied on enterprises in which any capital is invested. (2) The capital inflow may lower the rate of return on previously invested capital from abroad.

[16] For instance, the index of iron and steel production rose from 216.9 in March

duction of the defense program will cause dislocations conducive to lower productivity.

If the foregoing were the complete tale it could be said that from a production point-of-view only, the defense program could be taken in stride with little disturbance in the economy. However, there are elements in the situation that are not as satisfactory.

(1) A number of factors will tend to cause hindrances in production. In the first place, the shifts connected with the defense program may lead to temporary idleness of some resources, a situation that may be repeated with a program of military procurement associated with change in design of defense instruments. This also adds an element of uncertainty that will not be conducive to high productivity. Second, it may be expected that an important part of the program lies not in current production of defense weapons, but in provision for a rapid conversion of much industry for military production in the event of war. This may mean an all-purpose plant that is somewhat less efficient for civilian production. Third, defense procurement, on the limited scale envisaged, means short runs of many items, which, of course, involves loss of efficiency. Finally, material and capacity shortages and scarcity of some types of skilled labour caused by expanded demands for defense production may hamper civilian production. However, except in the case of skilled labour, these shortages should be relatively small, though not entirely negligible, in the Canadian program.[17] In accordance with the North Atlantic Treaty Organization agreement much of the Canadian program is built about provision for a greatly expanded air force; except for construction of air fields and hangars and some expansion of aircraft-building capacity this will not require large quantities of materials that are in really tight supply.[18] The requirements for steel, in the ship-building and army program, though substantial, are only a small part of total steel available, and until domestic facilities are available, much of the army equipment will be purchased in the United States, though there may also be some offsetting U. S. procurement in Canada. Shipyard capacity is probably nearly adequate for the ship-building program; some construction for army requirements may

1950 to 233.1 in September 1950 and 250.5 in March 1951. Bank of Canada, *op. cit.*, p. 99.

For estimates of increases in productivity per *man year* in the economy as a whole from 1929 to 1949 see O. J. Firestone, *Residential Real Estate in Canada* (University of Toronto Press, 1951, pp. 243-44).

[17] Defense expenditures for fiscal year 1951-52 as presented to Parliament in the official estimates are found in *Estimates for the Fiscal Year Ending March 31, 1952*, Ottawa, King's Printer, 1951.

[18] Canada is a large net exporter of many of the materials used in aircraft building and while she has obligations to maintain exports to regular customers she has more leeway than if she had been an importer. However, certain parts of planes, particularly engines, are imported.

be necessary. In all, steel requirements may be nearly met currently owing to well-maintained imports, expanded production at home, and some decline in demand for consumer durables resulting from the fiscal and monetary program. For the future, planned expansion in the steel industry should increase capacity by between one quarter and one third by 1953.

(2) Another counterbalancing factor to the expansionary forces has been a deterioration in our terms of trade that may continue. In an economy in which merchandise imports and exports each comprised about 17.5 percent of gross national product in 1950, such a matter is of some significance.[19]

In view of the foregoing, the production situation may be summed up as follows: (a) Within three years total expansion in production in the economy, assuming the current rate of immigration is maintained, has a potential equal to the increased requirements for defense purposes. (b) In the shorter run, much of the pressure on resources may be eased by a substantial net inflow of goods and services on international account amounting in the current year to possibly nearly half the defense outlay. This inflow may continue for some years. (c) Real per capita output for civilian use, including both consumer and producer goods, will take longer to recover to levels of 1950, since increased population will accompany the expanded labour force. Owing to the capital inflow, real goods available for civilian use will not fall as much as per capita production for civilian use. (d) Material shortages will, in the main, not be very great though they may have important marginal effects.

Public Economic Policy for Defense

Let us turn now to the means of achieving the objectives of the defense program, a matter which primarily involves public policy. At present, with a few exceptions such as in steel, Canadian policy is to attempt to achieve the transfer of resources by means of fiscal and monetary controls, within the framework of the price mechanism. The official view, which is widely shared, is that as yet it has not been demonstrated that these indirect controls are not the best way to maintain the balance that will avoid problems of rapid inflation on one hand and unused or inefficiently-used resources on the other.[20] This program is being followed in the double belief that, first, at present from an administrative view it is the only feasible means and second, if it is successful it will in the long run mean a more

[19] For comments on the terms of trade see Foreign Exchange Control Board, *Annual Report* to the Minister of Finance for the year 1950.

[20] The official attitude on many of the aspects of the defense program is given in the budget speech of April 10, 1951, *House of Commons Debates*, Official Report, Tuesday, April 10, 1951 (Ottawa, King's Printer, 1951).

vigorous, flexible, and economically efficient economy. The problems being faced are difficult but, it would appear, somewhat easier now than they may be at other times. The reason for this circumstance is that, at the present time, the forces operating to maintain total demand appear to be very strong. Hence, there is not great danger that if the monetary and fiscal controls were slightly overdone, the fall in income would lower demand sufficiently to reduce induced investment significantly, and thus set off a downward spiral that would be hard to check.[21] It appears more likely that we are pushing hard at the limits of demand for resource use; and any overdoing in curbing demand can be righted by appropriate adjustments in fiscal and monetary action without any great harm being done. This applies to the forces of domestic demand. Any great decline in exports would seriously affect the Canadian position, and exports depend largely on conditions in other countries. The only comments to be made in this regard are first, that the easing of the dollar shortage greatly reduces one serious problem of selling in non-dollar areas, and second, a fall in income in the main Canadian markets, associated as it would be with less buying, does not appear imminent.

The other side of the question is whether fiscal and monetary controls *can* check inflation under the present circumstances. From a purely mechanical point of view there should be no doubt that they can if applied sufficiently vigorously. Important questions are: Will the Canadian people support the required action and, equally important, Will those in official positions interpret the attitude of the people correctly? On both scores the answer is probably Yes. While undoubtedly much grumbling about high taxes and complaints about credit tightness will occur, yet concern about inflation is such that if an adequate program shows signs of stabilizing the situation, it might be expected to find general support, perhaps a much wider measure of support than would particular controls, in which an individual group has a special interest in pounding at the one that most affects it. To the present, the public attitude toward the recent fiscal and monetary matters appears to have been one of wait and see. At the official level, while in the past it appears that too much timidity has been shown, the recently introduced fiscal and monetary measures indicate a willingness to take much stronger action than hitherto. The resurrection of monetary action should provide a powerful support to fiscal measures, which by themselves would probably prove adequate only by running truly immense, and perhaps politically impossible, surpluses.

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[21] At critical levels on both the upswing and downswing of business activity it seems probable that moderate changes in income may induce changes in investment that lead to cumulative rises or falls in economic activity. It is my contention that we are not anywhere near such a critical level at present.

Assuming that institutional and political conditions will allow an adequate fiscal and monetary control of the situation to be maintained, is the current program sufficiently strong? By the last budget for the fiscal year ending March 31, 1952, expenditures of the Federal Government are to increase by 800 million dollars, or more than 25 percent. Additional tax levies have been made which it is estimated will keep the budget in balance in the present fiscal year and add about 600 million dollars in a full fiscal year; moreover, it is estimated that old taxes would yield about 200 million dollars additional in the present fiscal year. This means that increased rates of tax yield are expected to about equal increased rates of expenditures on a full year basis. If the estimates of revenue are correct, this, taken by itself, will add to inflationary pressure,[22] for private expenditure is unlikely to be cut down by the full amount of the increased tax collections. The changes in tax rates in the last budget were, roughly, 20 percent increases in the personal income tax, the corporate income tax, and the sales tax, accompanied by increases of varying amounts in excise taxes on tobacco and some consumer durables.[23] These taxes will lead to a cut in real private expenditure in proportions that vary downward from high levels for the sales and excise taxes to low levels under present circumstances for the corporate income tax; but in no case are the cuts in expenditure apt to equal the taxes. Actually the situation is better than implied in the budget, for it is likely that total tax revenues will be substantially higher than has been officially estimated, a view borne out by a surplus in the first two months alone of the current fiscal year equal to about 7.5 percent of total estimated expenditure;[24] and this despite the fact that personal income tax increases are only effective July 1. This rate of surplus will not likely be maintained since expenditures ordinarily rise toward the end of the fiscal year and defense expenditure is in an expansion phase; yet the surplus for the fiscal year is apt to be substantial.

Additional measures include a postponement, for four years, of taking of depreciation, for income tax purposes, on nonessential investment,[25]

[22] The income generating effects of a balanced budget have been discussed by Trygve Haavelmo in *Econometrica*, Vol. 13, 1945 and Henry Wallich in *Quarterly Journal of Economics*, Vol. LIX, 1944-45.

[23] An an example, the excise tax on automobiles is 25 percent and on stoves and refrigerators, 15 percent.

[24] A budgetary surplus of 275 million dollars for April and May, 1951 is reported in the official treasury statement given in the *Canada Gazette* (Ottawa, King's Printer) June 30, 1951.

[25] Public utilities, farmers, fishermen and professional people are not covered by the regulations. The Minister of Trade and Commerce is authorized, in his discretion, to issue certificates of eligibility for current depreciation on new plant and equipment deemed necessary for the defense effort, for processing primary products, or for direct use in transportation or communication. Since one of the objectives of the defense program is to have productive capacity built up for use in the event of war, much plant and equipment, not for immediate use in producing defense materials, may nevertheless be viewed as serving defense purposes.

considerable tightening of the money market with higher interest rates, an agreement of the commercial banks with the central bank not to increase the total of business credit outstanding, and a change in credit terms on consumer durables from one third down and 18 months to pay to one half down and 12 months to pay.

In spite of all these measures, which were known at the time of canvass, the forecast of capital expenditure at mid-1951 were higher than at the beginning of the year.[26] And it appears probable the pressure for new investment will remain. While space does not permit a detailed analysis, it may be said that particularly in the important housing field, pressure for continued building at high levels seems likely for some time. Net family formation has been nearly equal to the increase in the number of dwellings in recent years, a feature which may be expected to continue. The numbers of family and nonfamily groups without their own separate accommodations are much higher relative to the total numbers of such groups than at any time previously back to 1920, at which time our information begins. It would appear that only a substantial fall in personal income or a substantial relative increase in rents or in building and financing costs would cause the shortage of dwelling units to disappear in the next three or four years without a large volume of additional building.[27] Similarly, very substantial requirements in public utility expansion seem evident in the shortages of output. The profitableness of resource development seems high. And while there has been considerable commercial building a guess may be hazarded that the real boom in this field has not yet appeared. Only in manufacturing, which tapered off slightly in 1949-50, has some weakness appeared, though the capital forecast shows increased outlay, perhaps connected with the defense program, in 1951.

In the consumer field the higher excise taxes and stricter credit requirements appear to be reducing some sales of durables, though it is perhaps too early yet to tell what longer term effects will be.

As has been mentioned previously, the anticipated substantial capital import, perhaps equalling as much as a sixth of domestic capital formation, will through the additional goods provided, ease the inflationary pressure somewhat, though some of it is probably directly responsible for part of the domestic capital formation.[28]

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[26] A survey of businesses, by questionnaire, asking for their intentions regarding investment expenditure for the coming year, is made at the beginning of each year; a sample check on these intentions is made at the mid-year. The report on the outlook for investment at the beginning of 1951 may be found in Department of Trade and Commerce, *Private and Public Investment in Canada, Outlook, 1951.* The results of the mid-year check have been reported in the press.

[27] For information on this subject see O. J. Firestone, *Residential Real Estate in Canada,* especially Chapters 2, 7 and 8.

[28] It seems probable that some part of domestic capital formation is undertaken as a result of decisions made by the persons abroad who provide much of the financing.

The conclusion about the strength of inflationary forces stems from the above interpretation. It will require strong medicine to keep the situation healthy. On the whole the budgeting record has been good, though in part the surpluses have occurred because continuing inflation has caused revenues to rise buoyantly.[29] The monetary policy, on the other hand, has only recently assumed the stringency necessary to provide a strong retarding influence.[30] In view of the facts that (1) the defense program does not nearly approach that of the last war, (2) stringent fiscal and monetary controls are being applied, (3) holdings of liquid assets are probably down relative to gross national product, and (4) substantial capital imports are probable, it is apparent that strong forces in control of inflation are being applied. Only time will tell whether they are adequate; if they are not, there is sufficient flexibility in the government program to permit reasonably prompt remedial action.

Before leaving the sphere of public policy, brief comment should be made on one other aspect of policy. The Minister of Finance in his budget speech gave it as an object of policy that resource use for the defense program should be diverted from forms of capital outlay not necessary for the defense program, and from consumer durables rather than from other types of consumer expenditure. The reasons given were that such an objective was in interests of consumer welfare, and at the same time it would release the capacity and materials most needed for defense purposes. The deferred depreciation provisions, the special excise taxes on consumer durables, and the restrictions on consumer credit are largely designed for this purpose. It is presumably the hope that they will lead to the desired transfer of resources while minimizing distortions in the price structure and the need for direct controls. Measures of the excise-tax and credit-restriction type have been used before, but largely in circumstances in which it has been difficult to evaluate results. The deferred depreciation provision is entirely new; it might be expected to be effective ultimately in the rather limited field of commercial and nonessential manufacturing undertakings to which it largely applies. The mid-1951 survey of investment intentions showed only slight indication of its effect, but since it applied only to undertakings begun after April 10, 1951, there was perhaps not time for much of the results to be visible. In the light of the

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[29] On the basis of calculations made for purposes of the national accounts, federal surpluses in 1947, 1948, 1949 and 1950 were respectively 701, 785, 524, and 586 million dollars. It should be noted that *loans* made abroad by the Government are not included as a part of government expenditure in calculating the surplus.

[30] While it is hard to put an exact date on the time at which monetary action became more stringent, it may be noted that interest rates began rising in October 1950 and on long term governments have gone up one-half of one percent. The agreement with commercial banks (which can be effective in Canada since there are only 10 commercial banks) was made in February of 1951. For banking data see Bank of Canada, *Statistical Summary*, published monthly.

general budget provisions and the pressure of the large projected capital program noted before, it may be expected that the early phases of the defense program will cut more heavily into resource use for consumer purposes in general than envisaged in the budget and perhaps less heavily on use for capital creation. In the longer period the expectation of the budget statement may be more nearly attained. In both cases output of durable goods industries will most likely expand relative to those of non-durable goods and service industries.[31]

The Defense Program and External Trade

Little has been said about the effects of the defense programs on the nature and direction of international trade; one or two brief points may be made. While the much greater bilaterial balancing of the international transactions last year seemed to follow a general trend, it was probably much ahead of the trend and was not caused by the defense programs of NATO and allied countries. Much of the decline in exports to Commonwealth and European countries can be explained by currency stringencies; the more near balance with the United States can probably be partly attributed to import restrictions. The former difficulty has been very greatly alleviated, the latter feature eliminated. And the defense program is apt to strengthen trade in traditional channels.

With the dollar shortage eased and conditions of comparative advantage

[31] Since I have been dealing with the economy as a whole I have said little about agriculture specifically. The following information relative to agriculture is based upon material in the publications of the Dominion Bureau of Statistics, Ottawa; (1) *National Accounts, Income and Expenditure* published annually, (2) *Canadian Statistical Review*, published monthly and (3) *The Labour Force*, published quarterly. The composite index of prices of farm products (1935-39 = 100), after rising from 225.7 in December 1949 to 246.8 in July 1950, was 234.5 in December 1950 and 256.6 in April 1951. Field crop prices were down between December 1949 and April 1951, and animal product prices sharply up. General wholesale prices (1935-39 = 100) were 198.3 in December 1949, 212.0 in July 1950, 225.2 in December 1950 and 242.2 in April 1951. The index of prices of commodities and services used by farmers was 187.9 in January 1950 and 203.7 in January 1951. Net income of farm operators from farm production was 1,513 million dollars in 1949 and 1,424 million in 1950, part of the fall in income being accounted for by a low grade (though large) wheat crop. The number of persons employed in agriculture appears to be declining; it fell from 911 thousand males and 40 thousand females in March 1950, to 813 thousand males and 41 thousand females in March 1951. (The agricultural labour force is at seasonal lows on the dates given; for comparison at a high, it comprised 1,041 thousand males and 112 thousand females in August, 1950.) This decline in the agricultural labour force is perhaps connected with the very large amounts of farm machinery purchased since the war. The flow of farm machinery appears to be continuing; in the first four months of 1951, the latest for which data are available, the indexes of values of manufacturers' shipments and inventories of farm machinery were above those of the same period in 1950; value of imports of farm machinery declined somewhat in late 1951, but for the first three months of 1951 were only slightly below those of the same period in 1950.

still favouring purchases of foods and raw materials in Canada, it is not unreasonable to expect that exports to sterling areas and European countries will expand substantially. From the intentions for increased purchases of raw materials already expressed by the United Kingdom, a 50 percent increase in exports thereto seems indicated.[32] At the same time, no comparable rise in imports from the non-dollar area as a whole is to be anticipated. Purchases of raw materials, such as rubber and wool, at high prices, were made in substantial volume last year; one of the largest imports, British automobiles, is unlikely to expand owing to the fiscal program; many other products, such as textiles, are of a type that will likely be fairly stable in volume; and the change of the Canadian services from British to American type weapons removes a cause of buying in the United Kingdom. A moderate credit balance on current account with the non-dollar area may therefore be expected to re-emerge.

With the United States, Canada has been running a large deficit on merchandise account this year as compared with a near balance last year. While the value of exports to the United States has increased, the value of imports has risen a great deal more. A part of this rise of imports can be attributed to the removal of the import controls imposed in 1947, for imports from the United States which ordinarily display a high income-elasticity had risen little from 1948 to 1950. Further increases in Canadian income will be reflected in still greater purchases. Moreover, with the shift of the Canadian Armed Services to U. S. type weapons, substantial purchases of military equipment in the United States are to be expected until Canadian capacity is developed. On the other hand, the recent increase of the ceiling on United States purchases of military supplies in Canada to 300 million dollars, if it results in increased military buying, could serve as an important offset to the Canadian military purchases.[33] Current civilian imports may be abnormally large, owing to backlogs from the period of exchange restriction and to buying in anticipation of shortages. In the circumstances a large deficit on both merchandise and total current account may be expected this year, and more moderate though still substantial deficits subsequently.

[32] This was indicated in a government statement reported in the press, *Montreal Gazette*, May 26, 1951.

[33] Reported in the press, e.g., Canadian edition of *Time*, July 23, 1951.

DISCUSSION

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Professor Urquhart, in his careful analysis of the impact of the defense program on the Canadian economy, has made, it seems to me, the following main points:

1. The burden of the ultimate defense commitments should prove to be only a temporary burden on the rapidly expanding Canadian economy;
2. There may be temporary idleness of some resources as the shift takes place to defense activities;
3. Some temporary decline in resources available for civilian use may be expected;
4. Present fiscal and monetary policies are likely to be effective enough to prevent any serious further inflation.

The general impression I have gathered from Professor Urquhart's paper is that the impact to date of the defense program on our economy has been relatively small and is not likely to be important in the future. I am not an economist and therefore cannot attempt to analyze the situation from the viewpoint of an economist as Professor Urquhart has done. But from the point-of-view of the farmer, I feel that to date the impact has been very striking and the repercussions will be felt for some little time.

Reasons for This Point-of-View

From May 1950, the month before war broke out in Korea, to June of this year (1951), prices of industrial materials rose 32 percent; prices of farm products rose 15 percent; retail food prices rose 17 percent; the cost-of-living rose 12 percent. From May 1950 to May 1951, farm wage rates rose 12 percent ($84.64 to $94.88); wage rates in manufacturing rose 10.8 percent. We have to go back to the inflationary days of de-control (1946 to 1948) to find a comparable situation.

A year ago agriculture was threatened with food surpluses. Today, stocks of most products, except feed grains, are low. In Canada this applies to beef, pork, lamb, cheese, eggs, butter, and manufactured milk products.

High employment at relatively high wage rates has increased demands of the domestic market and greatly reduced the amount of farm products available for export. Temporarily, this has of course been satisfactory to agriculture, but the loss of stable export outlets could be a serious matter in the future, since external trade has been so important in the development and progress of the agricultural industry in Canada.

In the early months of 1950, some felt that our economy had begun a recession which, unless arrested, would develop into an economic depression. Any such trend there may have been certainly was arrested and reversed by the inauguration of the defense program following the outbreak of war in Korea in mid-year.

Defense operations and general high industrial activity are causing a severe labour shortage on the farms—there is a widespread feeling among farmers that it is the worst we have ever experienced in Canada. With industry continuing to expand at attractive wage rates, together with recruiting of men for the services, agriculture is almost certain to suffer a still further decline

in manpower. And should the defense program be transformed suddenly into a war program—a possibility upon which our defense program was predicated—the shortage of farm manpower could be critical from the standpoint of wartime food supply.

While the industrial requirements of the defense program have not to date handicapped agriculture appreciably by causing a shortage of essential materials and equipment, retail dealers in farm supplies and equipment claim that shortages which will hamper agriculture do exist now. For example, the retail outlet in Ottawa of one of the largest farm machinery companies in Canada says he ordered 12 hay balers this spring and received only three. He further explained that certain companies have dropped some farm machines from their list for production while the defense program lasts. He says he expected not less than a dozen grain binders and had to fight to get even two. The information he receives is that no more grain binders may be expected. More than that, even though harvest hasn't yet started in the Ottawa Valley, not one grain combine is available now. He believes that for the balance of the year we will be faced with a serious shortage of farm implements all along the line and that the situation is likely to be worse before it is better. The scarcity, of course, is appearing in articles and machines requiring steel, much of which is imported from United States. It must not be overlooked that our agriculture today is more highly mechanized than ever before, and declining manpower makes adequate provision of labour-saving machinery, and especially of replacement parts and repairs, a necessity for optimum production.

With demands of high employment and expanding industry likely to keep prices of industrial materials up and perhaps continuing to increase somewhat, the balance between the returns of farm and nonfarm groups can be expected to become progressively less favourable to agriculture. A large carry-over of feed grains, and prospects for a good crop of cereals across Canada, may this fall start a decline in prices of staple farm commodities. If this is correct, the defense program will be largely responsible for increasing and holding costs of goods and services which farmers buy at a high level while farm prices decline. This will not be a good thing for the Canadian economy as a whole.

Accordingly, I would say that, from the standpoint of agriculture particularly, the defense program has had on our economy an impact that is quite substantial, and that may in the next year or two become even greater.

THE AGRICULTURAL ECONOMIES OF CANADA AND THE UNITED STATES—PRESENT POSITION AND PROBABLE FUTURE TRENDS

Chairman: O. B. Jesness, University of Minnesota

THE CANADIAN AGRICULTURAL ECONOMY

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THIS paper may properly begin with a word of explanation regarding the general mode of treatment to be followed. It is obvious that any subject as comprehensive as the agricultural economy of Canada can be dealt with in various ways. The discussion might take the form of an historical account of the industry's development. Or one might attempt a detailed description of the structural pattern as it exists at present. Still another procedure might aim at a straight comparison of Canada's agriculture with that of some other country or countries. Consideration of these and other possible approaches suggested that no one of them was likely to achieve the particular aims which the program committee had in mind. In view of this and in the hope of securing something approaching an optimum use of the limited resources of time and space available, it has seemed desirable to examine the agricultural economy of Canada from three main standpoints or with three central ideas in mind. In what follows, therefore, the primary aim will be to focus attention on the major characteristics or distinctive features of the agricultural economy, on its more important current and prospective problems and on the nature and effects of Canadian-American relationships. Major emphasis will be given to the first of these.

General Characteristics of Agriculture

In June 1941, when the last Dominion-wide census was taken, Canada had 732,832 farms with a combined area of 173,563,282 acres. Slightly over half of this acreage was in an improved condition and almost 57 million acres of the improved land were in field crops. Despite the recent departure of large numbers to work in war industries or to enter the Armed Forces, 27.5 percent of the Canadian people were still living on these farms. By 1946, when the last census of the Prairie Provinces was taken, the number of farms had dropped to 706,000 and the area in farms to 171 million acres. While a slackening in the rate of growth had been getting more pronounced, this was the first time that an actual decline had occurred between two succeeding census-taking periods. It is generally

anticipated that the 1951 Census will show a further significant reduction in the number of farms, a corresponding rise in the acreage per farm, and a definite drop in the percentage of the population engaged in farming. Indeed, recent estimates place the present agricultural working force well below a quarter of the population.[1]

These facts appear to indicate that the so-called era of agricultural expansion has virtually come to an end. This may seem rather surprising to those many people in many countries, including our own, who have tended to think of Canada as a country with almost unlimited land settlement possibilities. While the present occupied farming acreage makes up only 13 percent of the total land area of the country, all but a minor part of the remainder is nonagricultural in character. Most authorities now agree that the areas suitable for further settlement are distinctly limited. It should also be noted that close to half of the occupied farming area is still in an unimproved condition and that factors such as varying fertility, broken topography, scattered nature, forest cover, and inaccessibility are likely to make any further improvement very expensive and uncertain.[2]

The relative maturity of settlement just indicated has definite significance for the future of agriculture. For one thing, it means that any future expansion of production will necessarily be the result of more intensive rather than more extensive land use. In the second place, to the extent that settlement has been completed, agriculture can no longer be thought of as a major outlet for immigrants. Until very recent years, whenever Canadian immigration was mentioned, it was agricultural immigration, and nothing else, that people had in mind. While many continue to think in these terms, there is growing awareness of the fact that most immigrants must henceforth seek other than agricultural employment. Those who settle on farms must, generally speaking, replace others who are either owner-operators or simply members of the farm labour force. In this connection, the fact that the country's total population has increased by approximately 2.5 million in the last decade while the farm population has remained stationary, or possibly even declined, is not without significance.[3] There seems little doubt that Canada's future population expansion will be primarily a phase of urban development.[4] Finally, if maturing

[1] See the article by J. F. Booth in the *Economic Analyst*, April 1951, Department of Agriculture, Ottawa.

[2] For an authoritative and detailed analysis of the agricultural settlement possibilities see W. A. Mackintosh, *Prairie Settlement: The Geographical Setting*, Vol. 1 of the *Canadian Frontiers of Settlement Series*, MacMillan, Toronto, 1934.

[3] The most recent population statistics may be found in the *Canadian Statistical Review*, April 1951, p. 7. For information concerning the distribution of population between farm and nonfarm consult any recent issue of the *Canada Year Book*.

[4] For a good discussion of agriculture as related to immigration see the article entitled "Canada as a Country of Immigration" by C. A. Dawson in the 1937 *Proceedings of the Canadian Agricultural Economics Society*.

settlement prevents production expansion, the relative importance of agriculture in the economy may be lessened. While the effect would probably be gradual it would be nonetheless distinct.

In respect to the structural pattern of agriculture, the most significant feature is the pronounced specialization in wheat production. In 1950 no less than 44 percent of all the field crop acreage in Canada and nearly 64 percent of that in the Prairie Provinces was devoted to wheat. Moreover, almost 96 percent of the total wheat acreage was located in the three Prairie Provinces. It may also be noted that in the same year the cash income from wheat sales amounted to $388 million or about 17½ percent of the income from the sale of all farm products. In certain earlier years when the relation between cereal and animal product prices was very different from that of the present, the income from wheat made up 30 percent or more of the total.[5] If one were to consider the income of the Prairie farmers only the percentage would, of course, be very much higher.[6]

The economic significance of this degree of specialization can scarcely be overemphasized. From the standpoint of production it has permitted large scale mechanization, development of fewer but larger farm units, and high productivity per worker. The farms of the Prairie Provinces, while only 38 percent of all farms in Canada, include 70 percent of the total farm acreage of the country and are equipped with 60 percent, by value, of all the implements and machinery. Moreover, the 1941 Census showed that they included 87 percent of the 195,000 farms, containing more than 300 acres, but were manned by only 36 percent of all males and females 14 years of age and over, or by one such person for every 150 acres of occupied land.[7] The 1951 Census will undoubtedly show a considerable further increase in the average size of farm and a decrease in the number of workers per unit of area. But while the larger farms and widespread mechanization have made for definite expansion in the output per worker and for efficient production in general, the chief determining factor of unit cost is still the yield per acre.

If specialization in wheat has meant efficient production, it is even more certain that it has resulted in efficient marketing. Indeed, it is difficult to see how any real marketing efficiency could have existed in the absence of specialized production. The use of modern grain marketing methods

[5] The most convenient and up-to-date source of statistical data such as that here included is the *Canadian Statistical Review* published monthly by the Dominion Bureau of Statistics, Ottawa, Canada.

[6] An excellent summary table showing the cash income in the Prairie Provinces, by products and for several years may be found in an article entitled "Economic Effects of the War on the Prairie Economy" by Vernon Fowke in *The Canadian Journal of Economics and Political Science*, August 1945, p. 378.

[7] *Census of Canada* 1941, Vol. 8, Table 28, p. 20.

and facilities would never have been warranted had not a volume business been assured. Apart from providing the volume which has made modern grain-marketing technology and its resulting economies possible, specialization has made it both necessary and possible for farmers to cooperate effectively. This, in turn, has tended to assure that the marketing methods employed were the most efficient possible. The net result has been the development of a structure which performs the marketing functions at remarkably low cost.[8]

While large-scale production has undoubtedly helped to achieve a low unit most of marketing, it has greatly intensified the problem of finding a market. Since it is obviously impossible for a few million people to consume several hundred million bushels of wheat, Canada has normally been faced with the task of securing foreign markets for around two thirds of her wheat output. This has resulted in serious price and income depressing effects in years when an abnormally large world supply resulted in a low price. (Changes in world demand are limited and very gradual.)

Irregularity of world supply is not, however, the only cause of wide fluctuations in the wheat grower's income. Variations in both yield and quality within Canada have been equally if not even more responsible. The coefficients of variation calculated for the average provincial yields of wheat from 1905 to 1930 were: Manitoba, 22 percent; Saskatchewan, 27 percent; Alberta, 34 percent.[9] The variation from one crop-reporting district to another and from farm to farm was, of course, much greater than this. And, as is generally known, the variation between the 1930's and 1940's was greater still, being the variation between a zero and a bumper yield in many cases. As for the grade of wheat the coefficient of variation over the period 1900-1930 for the three provinces considered together was 26 percent.[10] Generally speaking, districts which had the greatest variation in yield had the smallest variation in grade.

The combined effect of these variations in price, yield, and grade has been pronounced fluctuations in gross farm income. The fluctuations in net income have been even more drastic, inasmuch as the cost structure contains a large fixed element. This is highly significant, since it is net rather than gross income which determines the farmer's solvency.

A situation somewhat parallel to the one just indicated in respect to

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[8] A good brief description of Canadian grain-marketing including cost data on an itemized basis may be found in "Grain-Marketing Methods in Canada," *C.S.T.A. Review* issue, June 1935. A more extended account is *The Canadian Grain Trade* by D. A. MacGibbon, MacMillan, 1932. From the cost data included it is obvious that transportation cost makes up all but a small part of the total.

[9] An excellent discussion of income fluctuation and its causes entitled "The Economic Problem of Western Canada. An Approach to its Study" in *Proceedings of Canadian Agricultural Economics Society*, 1932, contains this and much additional data.

[10] Ibid.

western grain growers applies to Canadian agriculture generally. The difference is mainly one of degree. It is not merely that other farm groups such as the fruit, potato, or tobacco growers are equally specialized and subject to similar variations in price, yield, or grade. The main point is that Canadian agriculture as an industry is characterized by fluctuating income and fixed expenditures. While serious enough at all times, this situation has been particularly marked during depression periods.[11] During such periods, countries which normally import agricultural products from Canada tend to produce their own, even though costs may rise in some cases. The result is a restricted foreign demand for Canadian products. And since most of these, and wheat in particular, have a relatively inelastic demand, additional supplies cannot be disposed of in the domestic market without causing drastic price declines. On the other hand, farmers' costs tend to be kept rigid. Factors contributing to the rigidity include the large element of fixed costs connected with the processing, selling, and distributing of manufactured goods which farmers buy; the ability and inclination to increase tariff protection in order to maintain the prices of such goods; the geographic, racial, and language barriers to the free movement of labour; the inability to reduce the high overhead costs of maintaining governmental and social institutions in a large thinly-populated country; and the fact that goods have to be transported great distances at rates that are necessarily rigid.

What has just been said refers primarily to the general economic position of agriculture in times of economic adversity. There is, however, another sense in which the industry may be said to be particularly unsheltered even in the best of good times. For many years from a quarter to a half of the total Canadian farm production has had to be exported. In addition to around 70 percent of the wheat, exports have included significant percentages of livestock and livestock products and such things as apples, potatoes, tobacco, grass and clover seeds, and maple products. Indeed, almost all products have been on an export basis to some degree at certain seasons at least.

The main economic significance of this large scale dependence on exporting is that it has necessitated accepting prices in line with those available in the world outside.[12] This is really equivalent to saying that it is financially impossible to provide any significant degree of artificial price support. Even though agriculture's relative importance has been decreasing recently, it still represents a very large part of the country's eco-

[11] See *The Canadian Economy and Its Problems*, edited by H. A. Innis and A. F. W. Plumptre and published by Canadian Institute of International Affairs 1934, especially Part 1, Chap. 6, by K. W. Taylor.

[12] For a somewhat more extended discussion of this aspect of the subject see the article by the present writer in *this Journal*, Vol. XXXI, No. 4, Nov., 1949.

nomic life. To provide it with a significant price supplement would require a far larger contribution than the nonagricultural sections of the economy would be able or willing to give. Moreover, so far as the great bulk of Canadian production is concerned, the protective tariff cannot be used as a price-raising medium for the very good reason that importation is not a normal occurrence. This is merely a way of saying that no dual-price plan is applicable to Canada. In the third place, the necessity of finding large export markets means that Canadian costs and prices must be kept as low as possible in order to meet international price competition. It also means that Canadians must look in the direction of demand expansion rather than supply contraction for any hope of price improvement.

In line with what has just been said, it should be noted that dependence on exporting together with its implications for pricing policy appears to have been getting somewhat less pronounced recently. During the past few years Canada has experienced exceptional prosperity, with the result that natural birth-rates, immigration, and food consumption per capita have all increased markedly. The net effect has been an unusual increase in the absorptive capacity of the Canadian market for farm products. It should be noted, however, that, since per capita consumption is already fairly high, future expansion of the domestic market must depend primarily on population growth.

Expansion of the domestic market, however, does not necessarily reflect a corresponding contraction in the need for foreign markets. That need will contract only to the extent that agricultural production expands more slowly than domestic demand. Whether it actually has contracted, and if so, by how much, is not easily determined. The recent marked contraction in the exports of certain products such as bacon, cheese, and eggs has been accompanied by, and to a large extent compensated for, pronounced expansion in exports of beef and dairy cattle. During the past three years these have been far greater than at any time since confederation.[13] Moreover, exports of several minor products amounting to considerable in the aggregate have been expanding in recent years.

Consideration of such facts makes it obvious that Canada's dependence on foreign agricultural markets is still pronounced. While it may well be, as many believe, that certain products such as those of the dairy industry may shortly cease to be exported, this is likely to happen only because agricultural resources have been shifted to other farm enterprises. It does not necessarily mean that agriculture as a whole is becoming less dependent on export markets.

Apart from any trends in export market requirements, there is the important fact that nonagricultural activities are forming a steadily larger

[13] *Livestock Market Review*, 1950, p. 6.

part of the total economy and accounting for more of the national income. To the extent that this is true, the possibility of financing an agricultural price support program will obviously be greater.

Of the many other characteristics of Canada's agricultural economy which might be mentioned there is one which, because of its distinctiveness and economic importance, should probably receive special emphasis. We refer to the impact on farm production and living costs of the National Policy instituted in 1878. That policy aimed at encouraging secondary industries by providing tariff protection. While it has undoubtedly resulted in a more balanced economy, the limited size of the domestic market has prevented many manufacturers from obtaining anything like the full cost-reducing benefits which are possible in some other countries, like the United States, where market outlets are much larger. The concrete effect of this may be illustrated by noting the difference between Canadian and United States prices of a few articles which are currently widely used by farmers and which involve considerable outlay. In 1949 the Ontario farmer paid $215 more for his Chevrolet car, $190 more for a 1½-ton Chevrolet truck, about $140 more for a refrigerator and around $100 more for an electric stove.[14] For farmers living in western Canada or the Maritime Provinces the differential was very much greater. While there is no intention of suggesting that all Canadian manufactured goods prices are higher or higher by the degree just indicated, the evidence clearly shows that high buying prices constitute a major obstacle to efficient production and improved living standards on Canadian farms. While the Canadian farmer's land and labour costs may be lower on the average than those of his American counterpart, there can be little doubt that his capital equipment costs are very considerably greater. Apart from the fact that manufacturing costs and therefore factory prices are higher, there is the very important circumstance that all but a minor part of the manufacturing takes place in the two central provinces of Ontario and Quebec. This extreme regionalization means that a very large proportion of Canada's farmers must pay heavy transportation charges in addition to the price of the goods proper. Indeed, in view of the much wider dissemination of manufacturing plants in the United States than in Canada, it would not be surprising if most Canadian farmers paid higher delivered prices than Americans even for those goods which Canada is now able to make and sell at competitive factory prices.

Were space available, much more could be said relative to factors affecting productive efficiency. There can be no doubt, for example, that the particular climatic conditions which prevail in Canada exercise a pronounced influence on production costs. The mere fact that Canada is

[14] The American prices were obtained from *Agricultural Statistics 1950*, U.S.D.A.

farther north than the United States means that it is subject to shorter growing seasons and greater extremes of temperature. Longer and colder winters spell larger maintenance rations, longer and more expensive feeding and stabling seasons for livestock. It is for such reasons that milk production costs are higher in northern than in southern Ontario or that farmers who raise winter litters of pigs must ordinarily incur extra costs either in the form of artificial heating equipment or high mortality rates.

In respect to production costs there are one or two quite recent developments which seem rather significant. Whereas the major cash outlays made up less than half the total farm costs before 1939, they now account for well over 60 percent of the total. This is simply a way of saying that the opportunity of reducing total cost per unit through operating at full capacity is considerably less now than formerly. While one might think that the recent increased mechanization would have increased the capital investment and hence the percentage of total cost represented by overhead, this has been offset considerably for farmers as a class by the large scale reduction in mortgage indebtedness. On the other hand, operating cash costs have gone up because of the cost of operating and maintaining the new types of machinery; because of the increased use of fertilizers and of spray materials for controlling weeds, insects, and other pests; and because of the tendency to use more purchased feed as distinct from homegrown. With operating costs comprising a larger part of the total, farmers may be somewhat more hesitant about maintaining or expanding production in the event of a price decline.

One might also refer to the very decided improvement in the farm production plant in recent years. The net result of the repairs and additions to buildings, the replacement and modernizing of mechanical equipment, the rebuilding of fences, and the increased use of artificial fertilizers is that the potentialities of Canada's farms as producing units have been greatly expanded. Other recent developments should work in the same direction. For example, the fact that beef production has become increasingly more profitable than dairying in the last couple of years has resulted in many of the lower producing cows in dairy herds being sold for beef. In the same way the gradual elimination of the British market for Canadian eggs has caused a speeding up in the disposal of hens with low egg producing records and the selection of better laying strains. The general effect of this herd and flock culling is that farmers are now left with stock capable of producing more milk or eggs for a given input of feed and labour.

From the structural standpoint one should perhaps note that while livestock, dairy, and poultry enterprises are found to some extent in most settled parts of Canada, the cows or pigs or hens are very thinly scattered in many districts. A major effect of this is inability to secure large volume

of product per unit of area, with the result that many processing and other marketing costs tend to be abnormally high. Although parts of Ontario and Quebec form the main cheese-producing area, and Ontario and Alberta produce more hogs than other provinces, Canada has nothing equivalent to the American Corn-Hog Belt. Indeed, recent years have witnessed a steadily increasing tendency for hogs and hog feed to be produced in widely separated areas.

One final characteristic which deserves special mention is the wide variation in philosophic attitudes toward agriculture. The industry has recently become increasingly commercialized in all parts of the country; however, the difference in degree between western Canada and southern Ontario on the one hand and the rest of Canada on the other is very marked indeed. In the latter area farming tends to be thought of as an end in itself, a satisfying mode of human existence. In the former, there is much more of a tendency to think of it as a way of making a living than as a way of living.

Some Major Problems

This matter of philosophic attitudes is not unrelated to something which, in the opinion of many, is the most serious problem in the realm of Canadian agriculture. We are referring to the 1941 Census disclosure that one third of the farms were so unproductive that they contributed less than one tenth of the total commercial farm output in 1940.[15] These are the so-called subsistence farms, i.e., those on which more than half of the gross product is consumed by the farm family. Such farms exist in all provinces, but the percentage, amounting to almost half of the full-time farms, is much higher in Quebec and the Maritime Provinces than elsewhere. In these provinces only a quarter of the total farm sales is contributed by the subsistence half of the farms.[16] What is also significant, however, is the fact that, on the average, farms in these provinces which are ranked above the subsistence level are not nearly as productive as corresponding farms in other parts of the country. It is true that low productivity, whether on subsistence or super-subsistence farms, is undoubtedly due to many causes, including inferior land, insufficient capital, poor managerial ability, ignorance, inertia, adverse weather or plain bad luck; but in addition it would seem that an important explanation in many cases is the presence of an idealistic rather than a materialistic philosophy. In the last analysis, the assumption that low productivity presents a serious problem is based on a fairly complete acceptance of modern materialism.

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[15] *Eighth Census of Canada*, 1941, Vol. VIII.

[16] An article entitled "Do Canadian Farmers Produce a Fair Share of the National Income?" by G. L. Burton in *The Agricultural Institute Review*, Vol. 3, No. 3, May 1948, deals with this general problem in considerable detail .

In spite of the relation between productive efficiency and philosophic belief which has just been suggested, it cannot be doubted that a major obstacle to greater efficiency in Canadian farming is insufficient capital. In fact, many regard the problem of providing sufficient capital as the really crucial production problem. One authority has suggested that not more than 12 percent of Canada's farmers have enough capital to permit them to obtain a minimum standard of living.[17] The problem has many aspects. In part it is a matter of securing further adjustments in farm credit facilities. Closely integrated with it is the need for more and better financial arrangements between farmers and their families and improvements in tenancy systems. Greater efficiency in spending funds and using capital goods is also needed.

Lack of space makes it impossible to do more than mention a few of the many remaining problems. Most of them are anything but peculiar to Canada. There is the problem of adjusting to the socio-economic results of the continued drive for productive efficiency. In some areas the growth of farms and sparseness of population are making it extremely difficult to maintain rural institutions. There is the farm labour problem with its many facets, which is becoming increasingly acute. There is the problem of eliminating duplication and generally reducing transportation costs in a country where distances are great and where transportation cost necessarily forms a large part of both production and marketing costs. There is the immediate problem resulting from the increasingly unfavourable price-cost relationship which has accompanied the growing scarcity of raw materials, rising urban wage rates, and increased taxes. There is the extremely important but complicated problem of choosing the kind and degree of price support. This problem is basically one of reconciling the financial needs of the farmer with the limited capacity of the taxpayer and the needs of the more exposed and specialized farming areas with those of the relatively more secure and generalized sections. It also involves reconciling the very concept of support with the continued large scale dependence on export markets. A further and potentially serious problem is that of selling farm products in the United States market during periods when the market price is below the parity level. This, in short, is nothing less than the problem of reconciling Canada's agricultural marketing policy with the United States farm price policy. Perhaps more important than any of the foregoing is the problem, or rather series of problems, involved in any attempt to reduce wheat production in line with a long-run demand that shows signs of contracting. In this case the number of variables and degree of uncertainty seem almost unlimited. To begin with, there is the question of how far self-sufficiency in respect to wheat is

[17] See article "Revolution in Agriculture," by D. L. MacFarlane in *The Country Guide*, Winnipeg, Nov. 1948.

likely to go, how far and how fast the idea of an internationally expanded economy will be carried forward, and whether and when the prewar brand of multilateral trading will be restored. In the second place, the implications of a large scale shift from wheat-growing to other farm enterprises must be considered. Any such shift would greatly increase supplies of other products and necessitate the finding of additional markets. There is also the practical matter of effecting the shift. Wheat prices would probably have to get very low or other farm prices very high before many wheat-minded farmers could be induced to make the change. Moreover, it must not be forgotten that for large sections of western Canada it is not physically possible to shift. In such areas it is a case of wheat or nothing. Finally, any serious wheat reduction would mean that the elevator and other marketing facilities would be less fully used with consequent higher per unit marketing costs.

Canadian-American Relationships

Of the many important agricultural economic relationships between Canada and the United States, only one or two can be even briefly mentioned here. It may well be that some of those which are of a purely personal and educational nature are, after all, among the most significant. It is obviously impossible, for example, to measure the influence exerted by the interchange of views and experience at gatherings such as this. In the same way, the fact that the United States has been used as a graduate training ground by the great majority of Canadian agricultural scientists is undoubtedly far more significant than is commonly realized. The marked tendency of Canadians to look to the economically more mature United States for solutions to problems, research results and techniques, and general agricultural methodolgy cannot but have left its effect. Many things, such as the Canadian homestead system and cooperative legislation, were directly patterned on American precedents. The earliest farmer organizations in Canada were extensions of the United States Grange and Patrons of Industry. And in recent years there can be no doubt that the American parity concept has influenced Canada's agricultural price support policy.

It is, however, the trading relationships between the two countries which have elicited the greatest and most continuing interest and produced the most direct and widespread economic results. Periodically, for more than a century, mutual efforts have been made with varying degrees of success to bring about freer trade, and many Canadians have never ceased to think of the United States as a natural market for Canadian farm produce. At the same time, it has been generally recognized that the agricultural economies of the two countries tended to compete with rather than to complement each other. Both countries have ordinarily

been on an export basis in respect to several of the important products like wheat, bacon, tobacco, and certain fruits. So long as this situation continues, trade between the two countries will be at a minimum so far as these goods are concerned. If trading does occur it will probably be for one of three reasons. It may happen where a commodity is produced only in certain sections of the country and is wanted for consumption in other sections. In such cases it is often cheaper to bring it from adjacent sections of the neighbouring country than to pay for long transportation hauls from one section of a country to another. Again, it may happen where the product is relatively perishable, is consumed regularly, but is produced at different seasons in the two countries. This is the case with certain fruits and vegetables. Finally, it may occur where a product of one country is sufficiently different from that of the other. A case in point is that of Canadian wheat used for mixing purposes across the border. International trade which takes place for these reasons would seem to be following natural channels and should surely be encouraged wherever possible by the removal of trading obstacles.

In connection with trading, it is a matter of significance that Canada's producing and consuming population is much smaller than that of her neighbour. Because the scale of production and size of market are so different in the two countries, equal tariff concessions between them are sure to produce very unequal effects. Since Canada's cattle and human populations are only about one tenth and one eleventh respectively of those of the United States, it can easily be seen that the transference of, say, 200,000 cattle from Canada to the States would cause the price to rise much more in the Canadian market than it would fall in the American market. While this number of cattle would satisfy a very considerable part of the total Canadian demand, it is a very small fraction of the annual killings in the United States. If, on the other hand, we assume these cattle to be moving in the opposite direction, it can be seen that their transference would depress the Canadian price far more than it would raise the price in the States. The significance of all this for trade bargaining becomes clear. What it really means is that the United States can afford to offer far larger concessions than Canada on products that are liable to move in either direction. It also means that the United States can allow fairly free entry to any commodity, such as beef cattle or potatoes, which ordinarily moves only in the southern direction, without suffering any serious price depressing effects. This is especially true if the products are ones whose consumption varies fairly directly with the size of the population or if, for any reason, they are subject to an inelastic demand.

Specially significant at present is the major shift in the direction of Canada's agricultural exports which has recently occurred. In the past three years, bacon, cheese, and egg shipments to the United Kingdom have

dropped markedly, while cattle and dressed beef exports to the United States have shown a pronounced rise. As a result of the extremely high beef prices in the States, Canadian farmers have tended to stress production and sale of cattle for beef and to reduce production of hogs, poultry products, and milk. They have really chosen to export their livestock and livestock product surpluses to the United States in the form of cattle rather than to the United Kingdom in the form of bacon, cheese, and eggs. A very important question from the standpoint of future policy is whether they will be able to continue to do this. More concretely, what many Canadians would like to know is whether the recent large population increase and consequent expanded food requirements have so increased the United States' demand for beef cattle that really significant imports will be continuously required from now on. Along the same line, they would like to know whether the rapidly expanding population and growing economic maturity of the States are likely to result in that country's being on an import basis in respect to farm products which it has normally exported in competition with Canada. From Canada's standpoint, the great trouble heretofore has been twofold. In the first place, very few of the products which could be imported by the States were major items in Canada's production. In the second place, the few which were imported could seldom be taken in any quantity or continuously. An added difficulty has been the existence of considerable uncertainty regarding possible changes in tariffs, quotas, and import policy in general.

It may be that something more can be done to increase the complementary character of Canadian-American agricultural trade. Whatever success has been achieved in this direction to date has resulted mainly from using the horse-trading type of technique. Each such trade has represented a *quid pro quo* arrangement between a Canadian and American group who stood to gain directly. While such deals are important and the possibilities of increasing their number may be considerable, they are only part of the problem. After all, the main benefit which Canadian and American farmers can hope to gain from mutual international trade must come indirectly from concessions made not only on farm products but even more on goods of a nonagricultural character. This is so for the simple reason that nonfarm goods are the ones that have been and are most likely to be most traded in. Whether these indirect benefits can best be obtained through continued reliance on the trade agreement approach, or whether the time has arrived when continental integration can and should receive more than academic consideration, may be a debatable issue.[18]

[18] A suggestive but preliminary article dealing with this matter was written by the late D. A. Skelton and appeared in *this Journal*, Feb. 1942.

A MID-CENTURY LOOK AT AGRICULTURE IN THE UNITED STATES*

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A Look Backward

IN REVIEWING agricultural develpments over the last half century, one is impressed with the almost overwhelming influence of war and the aftermath of war, not only on agriculture but on the entire economy of the United States. It may be helpful, therefore, to divide the years beginning with 1900 into the following periods from the standpoint of external impacts on agriculture:

1900-1914—Relative stability and rising prices.
1915-1920—Wartime prosperity and price inflation.
1921-1929—Sharp depression followed by gradual recovery.
1930-1939—Deep depression followed by some recovery.
1940-1950—Wartime prosperity merging into the postwar transition and the Korean crisis.

By dividing the 51 years into these periods we get the impression that, except for the years 1900-14, world events associated with wars have overshadowed everything else—well, almost everything. Certainly the lightning change following the Korean outbreak is a vivid illustration of the impact of world events on commercial farming. Before Korea we were struggling with problems of transition from postwar food emergencies to production for peacetime markets. We were then worried about the threat of surpluses of wheat, cotton, and feed grains. Now many are worried about potential shortages. Agriculture has experienced a succession of such emergencies since the beginning of World War I, until we have almost begun to look upon recurring crises as the normal order of events.

Agricultural economics got its start in the years before World War I, and much of the economic theory upon which it is founded was developed under conditions of relative stability. No wonder those of us who are old enough to do so look back with considerable nostalgia to the "good old days" before 1914. One agricultural economist characterized those years as the "golden age of American agriculture."[1]

Then came wartime prosperity and the price inflation of World War I. From an economic standpoint, it was a pleasant experience for most farmers while it lasted. Farm prices more than doubled from 1915 to

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* This paper expresses the writer's personal viewpoint on the problems considered.

[1] E. G. Nourse, "The Foreign Situation as Conditioning American Agricultural Policy," in Conference on Economic Policy for American Agriculture, 1931.

1919. Land values soared, and so did farm indebtedness. Prosperity seemed to be here to stay, and land did not seem overpriced at 70 percent above prewar values. Higher debts could easily be carried as long as wartime prices prevailed. But deflation started in the fall of 1920 without previous warning to farmers. The resulting bank failures in rural areas, farm foreclosures, and other evidences of distress are an old story to most of you. The slow but gradual adjustment in the 1920's was painful, but there were tangible evidences of recovery when the second wave of depression struck.

TABLE I. INDEX OF PRICES RECEIVED BY FARMERS AND OPERATOR'S NET INCOME PER FARM, SELECTED YEARS AND PERIODS, 1910–50

Year or period	Farm prices 1910–14=100	Operator's net income per farm	
		Current dollars	Real income[a] dollars
Annual			
1900	68[b]	—[c]	—[c]
1910	103	589	595
1920	212	1,051	461
1930	125	688	478
1940	100	713	589
1945	206	2,147	1,325
1950	256	2,173	883
Averages			
1910–14[d]	100	566	566
1915–20	172	1,028	642
1921–29	142	820	522
1930–39	97	596	488
1940–50	207	2,021	1,058

[a] Current dollar income divided by the index of prices paid for commodities used for family living.
[b] From *U.S.D.A. Tech. Bul. 703*, Table 77.
[c] Not available.
[d] The years 1900–09 are omitted because no estimates of net income are available for those years.

The depression of the 1930's was not only more severe than in the early 1920's; it was accompanied by drought and crop failure in many areas, which accentuated its impact. The halting recovery in the late 1930's had made some progress by the time war struck again in Europe. The economy of the United States then began to operate under the forced draft of defense orders.

Rapid economic recovery resulted from the greatly increased wartime demands for agricultural products. Prosperity characterized most of the wartime transition. It has now been given another nudge by the Korean crisis and the resulting defense program.

Table I indicates the sharp price changes and the wide differences in operator's net income per farm for the five periods previously listed. The effects of wars and their aftermath on the economic fortunes of farmers in the United States are obvious. But in one sense they can be overempha-

sized. Other forces also have been operating. Some of them are external to the agricultural industry, and others operate within the industry itself. To be sure, many of these forces have been influenced by war upsets, but they also seem to have independent propulsion.

Table II indicates a doubling of the population of continental United States since 1900. If no other changes had taken place, that in itself would mean a doubling of the home market for farm products. But at the same time we have had a decided shift in population from the farms to the cities and towns, which has tended further to increase the size of the

TABLE 2.—TOTAL AND FARM POPULATION IN THE UNITED STATES, SELECTED YEARS AND PERIODS 1900–50

Year or period	United States population	Farm population	Farm, % of total
	Thousands	*Thousands*	*Percent*
Annual			
1900	75,995	31,500[a]	41.0[a]
1910	91,972	32,077	34.9
1920	105,711	31,614	29.9
1930	122,775	30,169	24.6
1940	131,669	30,269	23.0
1945	139,584	25,190	18.0
1950	151,772	—[b]	—[b]
Averages			
1910–14	94,723	32,197	34.0
1915–20	103,055	31,937	31.0
1921–29	114,617	30,832	26.9
1930–39	126,460	31,084	24.6
1940–49[c]	138,655[c]	27,629[c]	19.9

[a] Estimates based largely on total population and numbers of persons engaged in agricultural pursuits.
[b] Not available.
[c] 1940–49 average used because farm population estimates for 1950 are not yet available

market. And then, of course, there have been important changes in per capita consumption of food and other farm products; also changes in the relative importance of different foods in the national diet.

The ups and downs of the export market have been more closely related to international forces generated by wars. But they are also affected by internal developments. We have shifted since 1900 from dependence on the export market for nearly a fourth of our total farm output to less than 10 percent in recent years. The recent percentage would be much smaller if it were not for military aid and other economic assistance programs to other countries (Table III).

The wartime food needs of our allies, and especially the immediate postwar rehabilitation exports, resulted in rather serious maladjustments in our production pattern. For example, the need for wheat for food relief induced a 24.5 million acre expansion of wheat in our Great Plains Region from 1942 to 1949, an increase of 65 percent. This was a part of the cost

of the war and its aftermath, but it is a type of shift that may cause trouble in drought years, or when the time comes for transition from war and defense emergencies to peacetime conditions.

Agricultural exports to Canada have shown a gradual increase over the years. And they have been fairly well balanced with imports of agricultural products. By and large, this trade is complementary. The exports consist largely of cotton, tobacco, fruits, and early vegetables, which are not readily produced in Canada. Feeder cattle, livestock products, and seeds loom large in the list of imports.

TABLE III. TOTAL FARM OUTPUT, PERCENT OF FARM OUTPUT EXPORTED, AND INDEXES OF AGRICULTURAL EXPORTS, UNITED STATES, SELECTED YEARS AND PERIODS[a]

Year or period	Total farm output	Approx. percent of farm output exported[b]	Agricultural exports (1935–39 = 100)[c]				
			Total	Cotton and linters	Wheat and flour	Tobacco unmanufactured	Fruit
Annual							
1900	72	24	—	—	—	—	—
1910	79	16	—	—	—	—	—
1920	92	22	183	97	582	112	38
1930	95	11	133	124	209	137	118
1940	110	5	42	22	65	41	35
1945	129	9	119	45	300	116	63
1950	138	9	151	102	406	117	61
Averages							
1900–14	77	18	—	—	—	—	—
1915–20	86	19	179	101	392	108	36
1921–29	92	15	167	134	314	115	77
1930–39	97	8	111	117	109	101	99
1940–50	129	9	126	48	346	103	63

[a] Data for years before 1910 based on estimates of farm output and agricultural exports from *U.S.D.A. Tech. Bul. 703.*

[b] All agricultural exports valued at shipside as percentage of gross farm income.

[c] Index numbers of agricultural exports for years beginning July 1 with 1924–29 as the base period converted to a 1935–39 base. Beginning in January 1947 exports under Army civilian supply programs are included.

Within the agricultural industry itself, there is plenty of evidence that an internal transformation took place during the first half of the twentieth century. All of the shift to mechanical power has come during that time; most of it within the last 30 years. The remaining frontiers have been settled. Irrigation farming has become an important segment of agriculture in the Western States. For the last 30 years new land developments have been about offset by abandonment in some of the older areas; consequently, the total acreage of cropland has remained fairly stable; but not so the production per acre, especially in recent years. Improved production combinations have resulted in much higher production per acre and per breeding animal of food livestock. In 1950, crop production per acre was 27 percent above 1935-39, and production per unit of breeding livestock, 18 percent.

Total farm output has doubled since the turn of the century. A part of that increase came from expanding the area in cultivation during the first 20 years of the half century. Almost as large a portion was made possible by releasing land that formerly grew horse and mule feed for production of marketable commodities. But the most important factor in expanding the output was the higher production per acre and per animal. The combination of mechanical power and other improved methods of farming has enabled farmers greatly to increase output with a gradually decreasing labor supply on farms.

Let us turn now to the effects of both external and internal changes on the economic fortunes of farmers. These effects are difficult to trace because of the tidal waves of inflation and deflation. But Table I indicates that net incomes of operators on a per farm basis averaged $566 in the pre-World War I years, 1910-14, as compared with $1,028 in the war years, 1915-20. They reached a peak of $1,430 in 1919, but dropped back again to $554 in 1921 and averaged $820 per farm in the years 1921-29. The all-time low for the series beginning in 1910 was reached in 1932, with a net income per farm of $280, and an average of $596 for the years 1930-39. Then we come to the World War II period, and we find the net incomes per farm averaged $2,021 for the years 1940-50, with a peak of $2,980 in 1947. The average for the World War I years was approximately double the prewar years 1910-14, and the average for World War II and the early transition years was 3½ times the average level for the 1930's. Variations from one period to another are much less when adjustment is made for changes in prices paid for commodities used in family living, but the years 1940-50 stand out as the period with by far the highest real income per farm.

The disruptive influence of wars and their aftermath of depression can be seen in Figure 1, where farm output per man-hour from 1910-50 is compared with average real income per man-hour. The two war periods and the two severe depressions of the interwar years distort the underlying relationship. But despite their blurring effects it appears that real income per man-hour has increased with the gradual rise in physical output per man-hour.[2]

Many agricultural economists have been pessimistic about long-term benefits to farmers of technological developments because of inelastic demand for farm products. The familiar reasoning is that improvements usually (though not always) result in higher production of specific products. Therefore, when the larger output comes on, the market prices will be reduced so much that farmers as a group lose nearly all or most of the net gains from cost reduction. But this assumes no change in demand.

[2] Output per man-hour is of course an average rather than a marginal relationship; and average real income per man-hour includes a return for farm-owned capital as well as for the labor input.

And certainly in the war periods of the last half century market demands have expanded tremendously.[3] Over a longer period increases in population also result in larger market outlets without reduction in price. On the other hand, if production increases occur in periods of depression such as the 1930's, they would naturally accentuate the price decline. Much of our thinking with respect to the effect of technological improvements on farmers was developed in the depression years of the interwar period. But under such conditions, production increases that result from improved practices are likely to have only a minor influence on farm prices com-

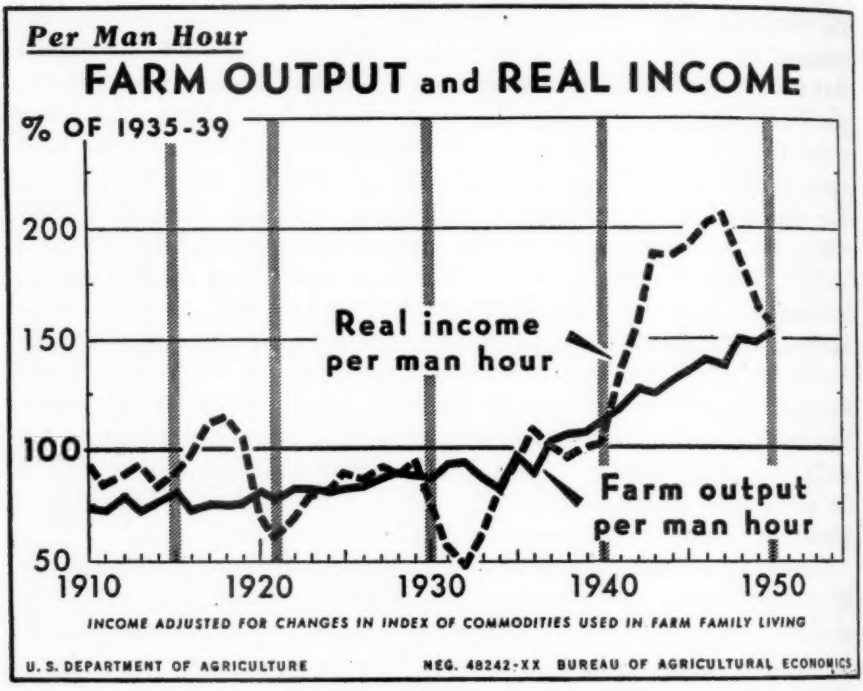

FIG. 1

pared with the drop in consumer purchasing power. Figure 2 indicates that output per capita was lowest in the 1930's (largely because of drought). But prices and income were also at their lowest levels then because of low purchasing power.

Production-increasing improvements come slowly in periods of depression and much more rapidly when the demand for farm products is in-

[3] The war years indicate that if a greatly expanded demand is not balanced with higher production, income to farmers temporarily may go higher than it would with concurrent increases in production. But output would be increased eventually, even without technological improvements, by investment of more resources in farming.

creasing. Another factor to consider is that those who first adopt a cost-reducing improvement hold all of the gain until production increases are sufficient to affect market prices. And prices may not drop sufficiently to offset all of the decrease in costs on farms that have adopted the improved methods. But farmers who have been unable to take advantage of new techniques will suffer losses in net income if price falls because of production-increasing improvements.

Most analyses of the effect of technological improvements on farm income neglect the modifying effect of institutional factors such as price

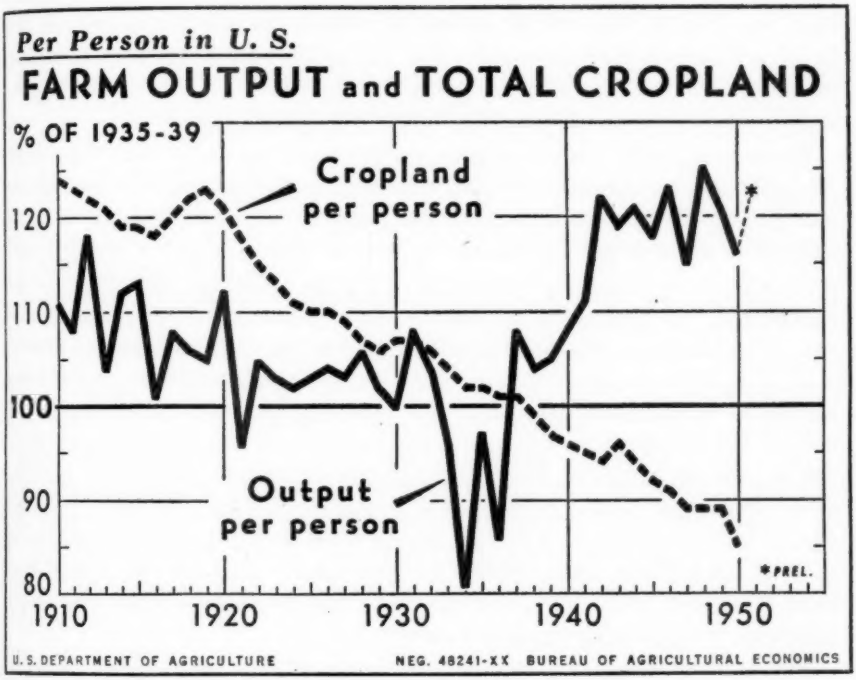

FIG. 2

support programs. Unless price supports are combined with production restrictions, farmers may retain most of the benefits resulting from cost reduction.[4] There is need for a thorough analysis of the differential effects of cost-reducing improvements under price support programs. For example, what are the effects on wheat farms versus cotton farms, and on cotton farms differently situated with respect to cost-reducing opportunities?

[4] But production of the commodity supported might become so attractive that more labor and capital are invested in it. The price of land and other resources then would be bid up and the gain would be capitalized into a higher cost structure.

The most important factor with respect to farmers obtaining benefits from improvements is the possibility of achieving new production combinations that actually result in a *lower total cost for the larger output* than formerly was incurred for a smaller output with the old practices. Achievement of such lower cost combinations sounds unattainable from a theoretical standpoint, but the historical record provides evidence that this has actually taken place in the commercial farming areas where technical progress has been most rapid. In the interwar period from 1919-21 to 1939-41 *total physical production inputs* actually decreased slightly for the country as a whole at the same time that total output increased by more than one fourth. The greatly expanded output during World War II did involve increases in total inputs, but not in proportion to output. Heavy purchases of machinery in the postwar years have added to total inputs and slowed down the decrease in inputs per unit of output.

Reduction in total costs with improved methods comes about in three ways: (1) By reduction of the labor force, especially hired workers, made possible by adoption of labor-saving equipment and practices; (2) by consolidation of farm units resulting in further release of farm workers and more effective use of equipment; and (3) by substituting more efficient equipment, for example, substitution of mechanical power for animal power and equipment especially adapted for use with mechanical power.

Although the economic effects of technological changes have been beneficial to farmers generally, the benefits have been unevenly distributed. Small farms in many areas of the country have been bypassed in the march of progress. The 1945 Census classified nearly one million farms, operated chiefly to provide a living for the farm family, that had gross values of farm products averaging $500 to $1,200 in the prosperous year of 1944. Hired labor groups in agriculture have benefited less than farm operators in the good commercial farming areas, despite the sharp increases in farm wage rates in recent years.

The most significant question with respect to technological changes, therefore, appears to be whether the flow of benefits can reach all farm people; and not whether all or part of the gains are shifted to other groups. The evidence seems fairly clear that farmers as a total group have benefited in the past and will continue to do so in the future. We need to be concerned, however, with the question of how benefits can be more widely distributed among farm peoples; also with how some inevitably unfavorable effects can be alleviated.

Summarizing our backward look over the last half century, the following seem to have been the most significant forces influencing agriculture:

1. Wars and their aftermath of depression, which were largely responsible for the wide fluctuations in the economic environment. Sometimes the

effects of external economic conditions completely overshadow adjustments that farmers could make on their own farms.

2. Growth of the home market, largely through increases in population but also from changes in consumer purchasing power, eating habits, and the changing rural-urban balance.
3. Development of government aids to agriculture. Price supports, soil conservation, and some credit programs had their origins in depression years; but government assistance in irrigation, drainage, and conservation of forest lands came in the early part of the century. These steps coincided with the rapid disappearance of free land. Although the beginnings of goverment aids to research and education go back to the 19th century, the results of research and invention which made the technological revolution possible had not begun to flow freely until after the turn of the century.
4. The impact of the technological revolution on agriculture. Improvements, both within agriculture and in other sectors of the economy, have generated significant changes in the agricultural industry. Those changes have transformed agricultural production and marketing as well as family living.[5] Young people of today find it hard to visualize farm life without the tractor, the automobile and electric lights. As late as 1935, only 11 percent of the farms received central station electric power, compared with 86 percent in 1951.
5. The technological revolution has greatly increased the farmer's dependence on the market, both for the sale of his products and for goods used in living and production. This change leaves him more vulnerable in years of poor crops or sagging markets.

A Look at the Current Scene

Most agricultural economists probably would agree that agricultural prosperity prevails in the summer of 1951. Tentative calculations from the July crop report indicate an all-time record farm output of 146 percent of 1935-39. Consumer incomes are high and export demands are continuing at high levels (encouraged, to be sure, by economic assistance and miiltary programs). The total demand for agricultural products is such that many people are wondering about potential shortages. During the past year the greatest pressure has centered on wool, cotton, and meat. The July 1 estimate of 29.5 million acres of cotton in cultivation indicates that unless growing conditions become extremely unfavorable the cotton supply situation will ease considerably. The wool situation is of course largely dependent on world supply and demand conditions that will not be relieved appreciably by the increases in domestic production now in prospect.

Largely because of the current meat situation, one of the questions most frequently asked is whether farm output can rise to the level of present

[5] For the effects of technological changes on rural life, see writer's article, "Technological Changes and the Future of Rural Life," *this Journal*, Vol. XXXII, No. 2, May 1950.

demands for farm products. My own view is that with an even break on the weather and with adequate supplies of fertilizer and other materials, farmers will produce feed enough for more livestock and more of other farm products which the market demands in the present defense emergency. We must recognize, however, that farming is a biological industry and it takes time to increase output; also that sufficient labor, equipment, and supplies must be available to do the job.

The overnight change in 1950 from worries about surpluses to prospective shortages emphasizes the need for adequate reserves of storable commodities in the present international emergency. We need to develop a program of *contingency reserves* that may be available to relieve shortages that might develop from unfavorable growing conditions or other emergencies.[6]

Although present signs seem to point toward continued prosperity, there are some warning clouds in the sky. The greatest threat to agriculture is inflation and its inevitable aftermath. All experience with inflation periods indicates that after a while the rising cost structure catches up with farmers. Then if any break occurs in farm prices, costs remain high and net farm income is sharply reduced. At the beginning of World War II, the events following World War I were much fresher in the farmer's memory, and he was probably more aware of the possible unfavorable effects of inflation than he is today. Are agricultural economists providing the materials useful to farmers in thinking through the need for balancing the short-term gains against the probable long-terms losses from the inflation spiral?

A part of the inflation threat originates on the farm. Land values have risen 14 percent in the past year and are still rising. They are 133 percent above the 1935-39 average and 36 percent above the level reached in March 1946, or shortly after the end of the war. Farm livestock and equipment also are valued at inflated prices. For example, farm value of all cattle was $67 per head in January 1945, $76 in 1946, and $160 in 1951. Farm debts are rising. Mortgage debt on January 1, 1951 was eight percent above a year ago and 26 percent above the low point in 1946. Nonreal estate debt has risen much more rapidly. On January 1 it was 119 percent above the low point in 1945.

Rising indebtedness is an indication that costs are catching up, especially for the young farmer who is getting started in farming. If he buys a farm, livestock, and equipment at average 1951 inventory values he will have to invest approximately 150 percent more than in 1940, and 50 per-

[6] These should be additional reserves—over and above the carry-over that would suffice under conditions of greater stability. Although it seems desirable to seize every favorable opportunity to build up contingency reserves, a balance between reserve building and current demands must be kept in mind.

cent more than in 1946, or shortly after the end of the war.[7] That means, of course, that a large portion of the favorable net incomes of former years have become translated into a higher cost structure. We need much more analysis of who benefits and who loses, and under what conditions, from such marked changes in capital values.

Perhaps the land boom and higher debt structure are clouds in the sky that bear watching. If the economy should falter in transition from the present defense build-up, farmers who have incurred heavy indebtedness and resulting fixed charges may be in serious difficulty.

A Look Forward

Let us now take a longer look ahead. Any reasonable attempt to consider agricultural prospects over a period of years involves certain assumptions, with respect to population growth, labor force, industrial output, exports, etc. The most important assumption, however, is with respect to progress toward peace. The history of the last half century indicates how badly any projection can be upset by international emergencies of various kinds. Although the last 40 years are not reassuring on this point, the following conjectures concerning agricultural prospects over the next quarter century involve the underlying assumption of eventual progress toward peacetime conditions.

Long-time agricultural prospects seem quite favorable. Under peacetime conditions the two most important factors in the market outlook for farm products are population increases and maintenance of high consumer purchasing power. Most of us have not paid sufficient attention to potential effect of the tremendous upsurge in the population of the United States.

The Bureau of the Census medium population projection for the United States indicates 190 million people by 1975, or an increase of about 25 percent from 1950. When this is mentioned the Neo-Malthusians become concerned about our ability to produce farm products for the greatly increased population. My own view is that farm production in the United States will keep up with any demands originating in the United States. We are not approaching any physical limitations on our production capacity. We have not reached a plateau in technological progress. Given time for adjustment, and economic incentives for investment in farm production, output can expand to meet market demands.[8]

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[7] The 1951 inventory would include about the same amount of livestock as in 1940, and about twice as much machinery and other equipment, but most of the additional equipment would be needed for successful operation under present methods.

[8] We must recognize, however, that more of the resources used in farm production are bought in the market. This means not only greater out-of-pocket costs but it also assumes availability of fertilizers, motor fuels, and other supplies. To a large extent, these resources have been substituted for land, and it is conceivable that production expansion could be retarded if supplies of these goods are limited.

If we assume a population of 190 million by 1975, per capita consumption about 15 percent above 1935-39, and a somewhat smaller volume of exports, farm output would need to increase about 25 percent above 1950. High per capita food consumption involves relatively greater increases in high-value foods, especially meats. With a general 25 percent increase in output, perhaps meat production would need to rise about 35 percent or more in order to balance with demand at high consumer incomes. If present preferences continue, greater expansion would be needed in beef and veal than in pork, and this would involve more attention to hay, pasture, and other forage. Fortunately, some of the recent technological changes indicate enormous possibilities in pasture improvement, in use of grass silage, and other improvements in the feed supply for roughage-consuming livestock. More cattle and sheep would be reared in the humid areas and on irrigated lands, but there seems to be no reason to worry about feed supplies for a cattle population of, say, 115 million by 1975.

A part of the increase in output would come from new irrigation developments in the West such as the projected development in the Missouri Basin; perhaps a larger part from clearing, drainage, and better utilization of lands in the South; but the major portion of the increase would come from higher production per acre of crop and pasture lands that would result from adoption of combinations of improved practices adapted to each area. The relatively greater demand for beef may impinge on wheat production in the Great Plains and to a smaller extent on some of the other crops in more humid areas. From the standpoint of trade relations between the United States and Canada, it seems likely that there would be a growing market for Canadian cattle to supplement our own production; also that wheat production in the United States would be relatively less important than in recent postwar years.

In contrast to the Neo-Malthusians, there are those who are greatly concerned about the potential market for farm products. They worry about the return of surpluses, especially during the process of shifting from high defense to more stable peacetime conditions. In such a period of transition we probably would encounter difficulties, because agriculture once expanded will not easily contract in response to slackening in demand for farm products. This is especially true of total farm output. Once individual farmers have expanded their production capacity, they are not likely to increase their net incomes by reducing farm output. Special difficulties will be encountered in adjusting those products which have no close production alternatives in the areas of concentrated production. Wheat and cotton are good examples.

Transition to production for peacetime markets would call for significant adjustments in production, but not for reduction in total output. To achieve the necessary adjustment would test our wisdom and our in-

genuity. But if a high level of consumer purchasing power is maintained there will be a market for the total output of farm products. We might illustrate this point with an analogous experience. If we had been able to increase livestock production more rapidly after World War II, we could have eliminated most of our surplus worries in 1949 and 1950. And incidentally, meat supplies would have been larger at the present time. Markets were available for the total output of our farm plant, but we were not able to achieve rapid adjustment toward more hay and pasture and more meat and milk.[9]

Paths to a Stronger and More Efficient Agriculture

In conclusion, I should like to suggest that perhaps agricultural economists now have an opportunity to provide long-range analyses of alternative policies that might serve as foundation stones for building a stronger and more efficient agriculture. We are not plagued by surpluses, and farmers generally are prosperous. We do have defense problems, but perhaps we can learn some lessons from them, especially how rapidly the scene can shift from surpluses to shortages.

A good place to begin may be to consider agriculture's responsibilities as well as its opportunities. Agriculture's first obligation is adequate and efficient production of farm products. In return for fulfilling that responsibility, farm people should have an opportunity to earn real incomes equal to those available in other occupations for the same skill and managerial ability. How can this opportunity best be protected under rapidly changing world conditions and their impacts on the economy of the United States?

All available evidence indicates that farmers as a group will benefit from further increases in production efficiency. Certainly this is true in the present defense emergency. But one of the crucial questions at the present time is whether adjustments during the defense period can be made in such a way that agriculture not only will become more efficient, but also can strengthen its ability to withstand any transition shocks that may be in store.

More than half the total hours of farm work are still spent in hand labor on crops and livestock. Much of it is hoeing, weeding, and hand harvesting—a type of "stoop labor" that receives relatively low returns even in prosperous times. Farm as well as industrial workers need adequate tools. Many farmers do not have enough land to make their efforts productive. There are still many areas where mechanization and larger farms would greatly increase production per worker, and would release

[9] In retrospect, we should not have been so worried about accumulating stocks of storable commodities, but existing legislation called for allotments and quotas under certain specific conditions.

a part of the population for employment in other lines. How to accomplish that is a part of working out the economic effects of changing technology. The natural science research on technical improvements needs to be balanced with economic research to determine how the new techniques can be made to pay out. For one thing, this means greater emphasis on adjustments needed on low-production farms, and in the less developed areas. We have "under-developed areas" in the United States as well as in other countries. Recent studies indicate that in some of these areas production per farm could be doubled by adoption of improved practices and at the same time workers could be released for other employment.[10]

We must not forget, however, that successful adoption of the new ways of farming requires greater managerial ability. Training of the young people growing up on farms who will find their greatest income advantage in farming may need much more attention than we are giving it at the present time.

If agriculture can go ahead at full speed on adoption of known improvements, on farm enlargement where necessary, on adjustments in farming systems where such changes are desirable from a long-range standpoint; if assistance can be provided in finding other employment for those who are no longer needed in farming, and if farmers can avoid the unfavorable effects of inflation—we shall be on the way to a stronger and more efficient agriculture. There will be fewer workers on farms, but a higher production per worker and also higher incomes per worker, unless the general economy falters and consumer purchasing power is greatly reduced. Farmers need protection against those eventualities for the same reason that workers need unemployment insurance.

If farmers and ranchers utilize the higher incomes of favorable years to pay off debts, to make improvements that result in more efficient farming and that conserve farm resources, to make needed shifts in farming, and to invest in health, education, and home conveniences for the farm family, they can retain for themselves most of the gain from efficiency in favorable years, and they can use a part of this gain as a reserve to help tide over leaner years that may result from unfavorable growing conditions, or reductions in consumer purchasing power.

Considering the economic outlook in a broader sense, the future is clouded with international uncertainties which might have serious repercussions on American agriculture. If we are permitted eventually to make progress toward peace and world rehabilitation, the future holds a promise of better living on American farms. At present it is a promise rather than an inevitable consequence. Fulfillment depends on eventual progress toward peace, and on maintenance of economic stability—on the farm and in the entire economy.

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[10] For example, North Carolina Tech. Bul. No. 87, *Opportunities for Adjustments in Farming Systems.*

DISCUSSION

GEORGE BRANDOW
The Pennsylvania State College

In attaching this short supplement to Dr. Johnson's excellent paper, I think I might well begin by amplifying his reference to low income farmers. One of the striking facts about American farms is their diversity as economic units. Our agricultural census, which has employed a very inclusive definition of a farm unit, reported almost six million farms in 1945. If we define a commercial farm loosely as one which under efficient management can produce enough for sale so that the operator can obtain a level of living which society regards as an acceptable minimum, then not more than half of these six million units are commercial farms. Roughly one fourth of the so-called farms are part-time or residential units, where the family does not depend mainly upon farming for its income. The remaining one fourth depend largely on farming for their income, but production and earnings per worker are very low. These subsistence units tend to be concentrated in certain parts of the nation, particularly in the Southeast, but all regions have some of them.

To think of the six million American farms as a homogeneous group in almost any sense is a major error. The half which are commercial farms sell about 90 percent of all the farm products put on the market. They are vitally affected by changes in cost-price relationships. Changing production technologies, price support or control programs, and the like, have direct impacts on them. The subsistence farms are inadequate economic units as now organized, however. Although some can work out a solution by making appropriate internal changes, often any real corrective requires population transfers, combination of some units and abandonment of others, and other equally difficult adjustments. While commercial farmers and middle class urban people are drawing closer together in their attitudes and customs, commercial and subsistence farmers are moving farther apart. It seems inevitable that the economic and other distinctions between commercial and subsistence farmers will be even greater in the future.

The statistics in Dr. Johnson's paper vividly show the income instability which farmers—largely commercial farmers as a group—have experienced in the United States. The individual farmer has had to contend with two main sources of unstable income—fluctuating prices and varying crop yields. I believe that Canadian farmers have suffered at least as much grief from fluctuating prices as have their southern neighbors, and I suspect that as a result of their greater dependence on crops, especially wheat, and their shorter growing season, Canadian farmers have had even more trouble with variable yields.

Goverment programs to deal with the instability of farm prices have been important in the United States for about 20 years. The main current of our farm price policy, except in wartime, has been dominated by the purpose of raising prices or of keeping them high. It has relied principally on such crude devices as diversion of products into storage and attempts to reduce production. Twice, wartime inflation has averted the necessity of facing the problem of what happens when further storage is not practicable and total output does not contract. That is to say, we now have had a fairly long experience with farm price programs without really learning much about measures suitable for an extended period of general economic stability. Goverment price programs are a permanent part of the American farm scene, but the issue of whether we

shall have rational policy promoting freedom and efficiency in agriculture or a constraining and coercive set of programs is still to be resolved.

The pattern of production of American farming has been gradually and slowly shifting away from the general category of crops toward the livestock products category, although the five postwar years have been an exception. The pattern seems likely to continue to shift in the direction of livestock (including dairy and poultry) unless war creates abnormal demands. Some crops probably are now overproduced for a peacetime economy: wheat certainly, and probably cotton and potatoes. Forage and feed grains offer the best alternative opportunities to many farmers growing overextended crops, and this means more livestock. Increasing emphasis on soil conservation also favors the animal industries. Shifts in demand are likely to move in the direction of livestock as well. The rising demand for beef in the past 10 years or more seems to me to represent a change in consumers' preference not entirely explained by higher incomes.

Dr. Johnson's paper raises the interesting and controversial question of whether the level of agricultural production is likely to be excessive or deficient with respect to demands in the next quarter-century. I definitely agree with him that chronic food shortages will not develop in the United States. Technological advances will continue to show us how to increase yields per acre and per animal. An important limitation on current production is the failure of many farmers to adopt improved practices promptly. The reasons for this are too numerous to discuss here, but I think we shall tend to close the gap between achieved and potential production.

I am not quite in agreement with him on the relation between increasing efficiency in agriculture and farm income. I think real income per farm worker will have an upward trend mainly because of rising production per worker in the economy at large. The majority of future advances in farm technology will retard the rise of income per worker in farming but will not eliminate it. Consequently, I share Dr. Johnson's belief that farmers will not be pauperized by a flood of output in the future. The economic lot of farmers will continue to depend greatly on the health of the general economy. Given high industrial employment and a reasonably stable price level, good farmers on good farms will prosper.

DISCUSSION

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I would like to open this discussion by amplifying to some extent what Professor Drummond has said about the occupational status of agriculture in Canada, for it would appear that many people in other countries still think of Canada primarily as an agricultural country and of the Canadians as a people more or less exclusively concerned with farming.

Agriculture is an important industry—one of the most important—but its position has declined, relatively, in recent years. The volume of agricultural production is two and one half times what it was in 1900; the production per farm and per farm worker is now double or nearly double that of the turn of the century and the contribution of Canadian farms to export trade has given to this country an important status among trading nations. But the annual value

of manufactured products, and of the products of our mines, forests, and fisheries now exceed by several times the value of the products of our farms. The decennial census which has just been completed will probably show that only about 20 percent of the people gainfully employed in Canada are engaged in farming.

As to potential production, Professor Drummond refers to the era of agricultural expansion as having virtually come to an end, since "areas suitable for further settlement are distinctly limited." Most agricultural economists would probably agree with this viewpoint, particularly if it meant settlement under methods of farming, economic conditions, and standards of living such as now prevail. The results of soil surveys would also appear to lend general support to such a conclusion. Many people, however, probably feel that this is a limited outlook, and the *Canada Yearbook* gives some support to their views by indicating that the unoccupied land potentially arable comprises an area of 280,777 square miles compared with an area presently occupied of 267,361 square miles.[1] Much of this land is, however, less accessible than land now in use and most of it is likely to be less suitable for farming.

In another respect the potential is likely to be less limited than agricultural economists realize, particularly if we think in terms of the longer run development. We in Canada, and to a large extent you in the United States, think in terms of an "extensive" agriculture. We are not yet far removed from the development stage and in both countries farms are still becoming larger. This trend will probably continue for some time. But there is also an "intensive" agricultural frontier. It is already with us. We see it around and about every growing urban centre. There, as the population increases, farms are divided and the number of small intensively farmed units grows with the population of the urban area. If you doubt this statement, drive out on the highways leading from the cities where you live and count the number of small commercial holdings. The same thing is happening in some more remote areas suitable for intensive production of certain products. As population increases, either by an excess of births over deaths or by immigration, this trend will increase. How fast it will increase and whether it will ever overtake the "extensive" trend will depend on a lot of things, including wars, immigration policy, new developments in mechanization, further changes in nutritional habits and the like. But surely it is a potential. It is a mistake to think in terms of a static pattern of farming when trying to relate agriculture to a dynamic economy.

The speaker credits the export market with taking from a quarter to a half of Canadian farm production, and notes that though certain products may shortly cease to be exported, this "does not mean that agriculture as a whole is becoming less dependent on export markets." On the first point I would put the export figures at from a fifth to a third of total farm production. On the second, the result is a matter of interpretation. The significance of export trade to the total agricultural economy depends more upon the variety of products and numbers of producers affected than upon the volume of export trade. For instance, an increase in cattle exports will not offset the disappearance of cheese from export trade. The total value of cattle sales will not be greatly changed, if at all, by increasing the percentage exported, for all cattle sales already reflect export prices. But if the output of cheese, which now takes but a small percentage of the total milk supply, should be reduced to the basis of domestic

[1] *The Canada Yearbook 1950*, p. 17.

requirements, it might well result in all dairy products going to a higher domestic price level. In this case several hundred thousand farmers would be affected and agriculture would surely be less dependent on export trade, even though the total value of exports remained the same.

Professor Drummond's reference to protectionist policies and particularly to the National Policy of the 1870's will strike a responsive chord in many quarters. He might have gone farther than he did. He might have pointed out, for instance, that this policy, together with similar policies in the United States and elsewhere in the New World, resulted in curtailment of imports from Europe, and that it was not an accident that European nations, to protect their balance of trade, began turning to protectionist agricultural policies as early as the 1890's.

Finally a word about production responses. Professor Drummond states, "with operating costs comprising a larger part of the total (cost) farmers may be somewhat more hesitant about maintaining or expanding production in the event of a price decline." This, to me, opens an interesting field for speculation and research.

Various farm economists, particularly in the United States, have pointed out that the total volume of agricultural production has not varied much with changes in price such as occur in alternating periods of depression and prosperity. With allowances for the fact that in the first postwar depression Canadian agriculture was still experiencing pioneer settlement and expansion, and with further allowances for greater variability associated with climatic differences, the response to price changes in Canada was similar to that experienced in the United States. Farmers did not decrease production appreciably during the 1920-23 and 1929-33 depression periods or increase it appreciably during subsequent periods of economic recovery.

But how do we explain the significant increases in over-all production between 1940 and 1942? Or 1943, when prices were rising? Can they be attributed entirely to the war and to patriotic responses? It will be remembered that these increases, which were of the magnitude of at least 30 percent in each country, occurred in a period of rapidly declining labour forces and at the time when inventories of farm machinery were still experiencing the effect of a depression. Can they be related to generally favorable climatic conditions or to the latent application of improved techniques and scientific knowledge?

Furthermore, how do we explain the fact that since the latter part of that war period with still higher prices, much more machinery, and for a time at least more farm labour, there has been little or no further increase in production, in Canada at least?

Most of the research relating to such matters dealt with the experiences of the interwar period when prices generally were low, when indebtedness was high and when, except for a brief period in the 1920's, there was general underemployment of resources. It would appear that we now need to study production responses in periods of relatively high prices, low indebtedness and full employment.

PRICE POLICY IN THE PRESENT EMERGENCY

Chairman: J. F. Booth, Department of Agriculture, Canada

THE CANADIAN APPROACH TO THE CONTROL OF INFLATION

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IN HIS budget speech in the House of Commons last April the Canadian Minister of Finance said there were two great issues facing the world today—the pursuit of peace and the control of inflation. Neither of these, he went on to say, were pecularily Canadian problems—they were, and are, world-wide in their incidence and in their implications; and in respect to neither of them can we in Canada be fully masters of our own destiny. Few countries export a higher proportion of their produce than does Canada, and few import a higher proportion of what they consume; hence, over a very wide segment of our economy prices are determined for us by external forces. Since we are so inextricably, and normally so advantageously, linked with the international economy, we cannot effectively insulate ourselves against these external forces except at the cost of denying the whole logic of our geography, our resources, and our historical development. A Canadian approach to any problem must have regard to these fundamental physical and economic facts.

Recent public discussion of the control of inflation has been further complicated by some degree of misinterpretation of our experiences in the past 10 years. It is generally agreed that Canadian price controls during the war and immediate postwar years were carried through in a highly competent manner, but there has flowed from this a widespread but mistaken identification of the control of prices with the control of inflation. The results we achieved in stabilizing prices between 1941 and 1947, and the means by which we achieved them, have remained in the minds of most of our people in an oversimplified form. They do not realize or recall how powerfully effective were the indirect controls applied during the war—the very heavy taxation, the stiff controls over credit, and the vigour with which we set about mobilizing and maximizing the volume of real personal savings. Under conditions of total mobilization, these fundamental measures had to be supplemented by a massive application of direct controls—controls over prices, controls over wages and the direction of manpower, controls through priorities, allocations and rationing, and the almost complete governmental control over rights to import or export. But out of this great and varied panoply of controls, both direct and indirect, the average Canadian seems clearly to remember only the "price ceiling," and appears to attribute almost

the whole of the success of wartime stabilization to this one device. These imperfect and selective recollections of the past have confused and complicated the current of our present arguments.

Before embarking upon a description of the present anti-inflationary policies of the Canadian government, it will be useful to set the problem into the perspective of our postwar economic development.

What are the principal characteristics of the postwar economy in Canada? What is the background against which our present problems have to be set? It seems to me that though the development of the Canadian economy in the last five years has been supported and stimulated by a heavy backlog of demand, its outstanding characteristics have flowed very largely from the discovery of new resources and the development and exploitation of a fairly recently acquired industrial "know-how."

The discovery of oil on a large scale in the West, of iron ore in both the Centre and the East, and many other similar developments, have produced a remarkable change in the general outlook of the Canadian people. The nineteen-thirties left a deep psychological scar on the minds of a whole generation of Canadians. We tended to become cautious, to play safe and seek shelter. Few of our current generation of business leaders have had experience of a time when the economy was expanding rapidly in response to peacetime demands. We have to go back at least to the middle or late twenties, or better still, to before the World War I, to find a time in which the imagination of the Canadian people had been captured by the unfolding prospects of a great era of expansion. Since 1945 we have regained much of this former buoyancy of spirit without, however, falling victims to the excessive speculative fever that marked some earlier periods in our history.

This postwar era of expansion, sparked in part by new discoveries of natural resources, and in part by the acquired specialized know-how that came out of wartime production, has produced a tremendous capital investment boom in this country. From the point of view of the economy as a whole, the capital investment boom of the last five years has been the most striking statistical characteristic of our Canadian record. Since 1946, for example, nearly $10 billion worth of new plant and machinery has been installed by Canadian industry. Every year we have been breaking previous records, and 1951 seems likely to be no exception. Private capital investment in Canada in 1951 will probably exceed 1950 by more than 10 percent in volume, and more than 20 percent in value, and total capital investment will appropriate more than 22 percent of the gross national product.

A third characteristic of the postwar economy in Canada was the very rapid increase in prices after the end of the war as we relaxed the war-

time controls. This increase was due partly to a translation of wartime subsidies into price and partly to a general inflationary trend to higher prices throughout the world. The rapid increase in world prices took place in 1946-47, but in Canada was delayed for about a year by the slower pace of decontrol. By the middle of 1948, the effect of the war and its aftermath had largely worked itself out and the price structure levelled off. We then had about 18 months of stable prices; in fact, the general trend was slightly downward from the summer of 1948 to the spring of 1950.

A fourth characteristic of the postwar economy has been an almost uninterrupted state of "full employment" for both manpower and capital equipment. From the summer of 1949 to the spring of 1950 there was some easing in this tight position, but throughout the postwar period as a whole our productive resources have been operating almost continuously at full capacity, and scarcity rather than surplus has been the problem of the labour market.

The five years prior to mid-1950 held out for us great promise of a sustained period of vigorous and healthy expansion of a kind which we had not seen in Canada for nearly a generation. And it is one of the tragedies of our time that, just as we were embarking upon this rather exciting period of peaceful expansion, we should be compelled to divert so much of our resources into a rearmament and defense program.

Our current position still is that everybody is expecting and striving for bigger and better things, consumers to raise their levels of consumption (and also to increase their leisure), business men to expand and improve their capital equipment at a rate even faster than before, and on top of all this we find that as a nation we must more than quadruple our normal rate of defense expenditures. It is clear that we simply cannot do all these things at once. We cannot carry out our defense programs, increase our standards of living and leisure, and increase our rate of capital accumulation all in the same short time with the resources we have at our disposal. Something has to give way.

The problem we are facing is primarily one of proper balance, a problem of the right assessment of priorities, which in the world of today has to be kept highly flexible. This, of course, is not peculiar to Canada; the same problem exists in the United States, and United Kingdom and the other nations of Western Europe; and I rather suspect that similar issues face our opposite numbers behind the Iron Curtain. It is this attempt to expand defense, to improve standards of living, and to increase private capital expansion all at the same time that has been responsible, in large measure, for the sharp renewal of world-wide inflation during the past 12 months.

In a democratic country in which public opinion is deeply attached

to the substance of freedom—freedom to choose one's employment or vocation, a free market, and free collective bargaining—the task of government is not to order and direct the Nation's economy, but rather to guide, steer, or nudge the economy toward the objectives dictated by the national interest.

If we faced a clear-cut task of limited duration, as we did during the war, our job would be intensively onerous but in essence comparatively simple. We could address ourselves with singleness of purpose to "winning the war," and an almost unanimous public would accept a suspension of many of its normal freedoms for two, or three or five years. But the prospect that faces us today is not so simple. While we should not be wholly unprepared for a miracle which would reestablish morality and good faith as a rule among nations, we must nevertheless face the probability of having to live in the kind of world in which we now find ourselves for 10, or 15 or perhaps 20 years or more, building and maintaining a preponderance of defensive strength, devoting an uncomfortable proportion of our resources to that purpose, and doing all this without sacrificing the essentials of a free society.

The essence of the world struggle today is between freedom and authority—the dignity of the individual against the doctrine of the Great State. The citizens of a free nation can voluntarily surrender their liberties for a crisis of short duration and still resume them, though even in a few short years of storage they are apt to become spotted and a bit tarnished. Could they abandon these liberties for a decade or a generation and expect to get them back in recognizable form? The economic measures we adopt should be either of a kind which will have served their full purpose within two or three years, or of a kind which we can live with for 10 or 20 years and still remain free.

It seems to me that the oversimplified popular argument for immediate over-all price controls fails on three counts; first, that by themselves they will be ineffective, since they do not go to the root of the matter; second, that to be administratively possible they require a unanimity of support, a singleness of purpose, and an acute sense of urgency which do not at present exist; and finally, that unless we can feel sure that they can be abandoned within a relatively short time, they will begin to erode the foundations of the very freedom we are resolved to defend.

Canadian anti-inflation policy is presently based upon a view that we are not engaged in a short, sharp struggle, but that we face a long pull. Our attack upon inflation should be directed at its roots, and our means of attack should be capable of sustained application and consistent with our normal concepts of freedom. In practice this means the energetic use of the so-called indirect, but primary methods of monetary, fiscal, and credit policies, supplemented where necessary by direct controls at particular points of pressure.

The principal sources of inflationary pressure in Canada are four-fold. First is the effect of external prices on the Canadian price level. We import more than one fifth of everything we consume and we export more than one fifth of everything we produce. A very high fraction of the Canadian price structure is therefore determined or heavily influenced by what outsiders either charge us for the things we use or are willing to pay us for the things we produce. Second is our internal capital investment boom which has exerted, and continues to exert, a strong inflationary pressure, and to which I have already referred. Third is the strong and not unnatural desire of all groups in the community to improve their standards of living, both in terms of consumption and leisure, with resultant demands for higher wages and prices, shorter hours, more social security, and resistance to particular measures that may impose obstacles to the realization of these desires.

Then there has been the wave of abnormally heavy buying, both by consumers and by trade and industry. The increase in business inventories, which at $100 million had been abnormally low in 1949, was more than $800 million in 1950, and seems likely to be even greater in 1951. Consumer buying in 1950 was $750 million above 1949, while consumer incomes were only $600 million higher. In other words, the increased rate of consumption outstripped the rate of increase in incomes with a resultant drop in personal savings. Present indications for 1951 are that consumer spending is still on the increase, but that incomes are rising slightly faster, and that there may be an increase in personal savings back to the 1949 gross amount.

I turn now to a direct description of the Canadian Government's anti-inflationary policies, but by way of preface I must make two brief points. The first is that in a free country the Government cannot, of itself and by itself, control inflation, and it is rather disturbing to those who set a high value on the maintenance of free and dynamic democratic institutions to find so many and such large groups of the community who seem to think that this is primarily and almost entirely the Government's job. Governments, of course, have a very definite responsibility to provide direction and leadership, but they cannot do it alone. Any economic policy to be effective requires the active support and understanding of all groups in the community. In the present situation all have a part to play. If we are to contain and control inflation, we need energetic government action; but as much or more, we need restraint and good sense on the part of all groups and classes in the community, in respect to prices, in respect to wages, in respect to hours and efficiency of work, in respect to spending and saving.

My second prefatory comment is that it is important to draw a clear distinction between rising prices and inflation. The two are not the same. Inflation will result in rising prices, unless it is suppressed or driven

underground; but paradoxically, rising prices may be a cure for inflation. Any short definition of inflation is bound to be an oversimplification. "Too much money chasing too few goods" can be expanded to read that inflation develops when the flow of purchasing power into the market persistently exceeds the flow of goods and services at presently prevailing prices; but true inflation is characterized by a spiralling effect, where rising prices, rising costs, and rising money incomes react or feed upon each other. Price increases that absorb purchasing power without increasing spendable income, or that restrain total consumption, do not have this spiralling effect.

Canadian policies designed to contain inflation have been directed at the principal sources of pressure. I use the word "contain" advisedly because one of the main sources of pressure—the behavior of external prices—is largely beyond our control. Our freedom of action in influencing the exchange rate of the Canadian dollar is, in practice, rather narrowly circumscribed, and our role in international commodity discussions must be modest in line with our international stature.

First, I should refer to fiscal policy. In its first three postwar years the Government actively budgeted for large surpluses, and in those three years it reduced its net debt by $1.6 billion, or about 12 percent. In subsequent years it budgeted for more normal surpluses, and taking the five years 1946 to 1950 it has reduced its debt by nearly $2 billion, or about 15 percent. In its post-Korea budgets the Government has had to cover an increase of more than 50 percent in total expenditures. In designing a tax policy to meet its full costs the Government has had in mind the need for increased production, increased savings, and moderation in consumption. While it is right that incomes, both personal and corporate, should pay higher rates, a reasonable balance should be held between taxes on earning and taxes on spending. The Government's tax program, therefore, has been designed to secure 45 percent of the increase from sales and excise taxes, that is, from taxes on spending. In other words, it is using the device of higher prices to curb inflation, by restraining consumption and encouraging saving.

In the field of interest rates the first step in the post-Korea period was taken in October, when the Bank of Canada raised its rate from 1.5 to 2.0 percent. This was followed by a policy of not intervening, except to provide steadying influences, when the long term bond rate started to rise. In the summer of 1950 the long term rate was around 2.7 percent; between September 1950 and March 1951 it rose to 3.2. Since March the rate has fluctuated narrowly between 3.2 and 3.25 percent. Other interest rates have followed this pattern, and, generally speaking, interest rates in Canada are one-half to one percent above those of a year ago. In conformity with these higher interest rates the Central Bank has

followed a policy of keeping the banking system in a fairly tight cash position.

In September 1950, the Government took another step which had anti-inflationary implications, when it withdrew its official rates on foreign exchange and allowed the Canadian dollar to seek its own level in response to the normal forces of supply and demand in the current market. The United States dollar as a result declined from its $1.10 rate, and has been fluctuating in the $1.05 to $1.07 range. This has had the effect of reducing the cost of imports and the internal price of exports by some three to five percent below what they would otherwise have been. At the same time the Government has found itself in a comfortable exchange reserve position, and it would be possible to finance substantial quantities of essential imports from these reserves, should the necessity arise.

In the autumn of 1950 the Government moved to restrain the expansion of credit, paralleling its policy in the matter of interest rates. In November the first installment of consumer credit regulations was introduced. This was followed in February by a conference between the Bank of Canada and the chartered banks, as a result of which the banks agreed that restraint in bank lending was in the general interest and indicated that they would revise their lending policies so as to avoid further increases in the aggregate volume of bank loans. In March 1951 the consumer credit regulations were sharply stiffened, and in June interest rates on government housing loans were increased by one half percent.

Finally, I must refer to a novel experiment the Government is making in an attempt to apply the brakes to the less essential forms of capital investment. For a four-year period commencing in April 1951, depreciation on newly acquired capital assets will not be allowed as a deduction from income for tax purposes except for listed classes of undertakings deemed essential for defense purposes or for basic national development. This means that in all but the excepted classes the commencement of depreciation charges on newly acquired assets is deferred until 1955. There is evidence that this device has resulted in a considerable review of private capital expansion plans, and indications are that while the over-all total of planned investment has not changed much, its pattern and distribution have been noticeably shifted toward more fundamental and essential types of investment. At the same time, the Government has greatly reduced its own construction program in the non-defense field.

To summarize, the Canadian Government since the late summer of 1950 has been following an energetic policy designed to bring the flow of spending into better alignment with the available flow of consumable resources. It has freed the exchange rate, allowed interest rates to rise, tightened up all forms of credit, increased taxes with emphasis on taxes

on spending, applied a sharp deterrent to the less essential forms of capital expansion, and followed an unambiguous pay-as-you-go budgetary policy.

In addition to these policies designed to attack the inflationary spiral at its root, the Government has adopted a number of direct controls which are designed to fit into the general pattern, to plug the holes, and help to nudge the economy in the right direction. These include the controls or priorities relating to the uses of steel, base metals, certain chemicals, pulp and paper, and a few others.

It is of the nature of "indirect" controls that it is not possible to measure their precise effects. There is ample evidence, however, that they are taking hold, and there is good reason to hope that they will be sufficiently strongly established to meet and contain the new inflationary pressures that may arise as the tempo of defense production moves toward its peak.

It is also clear that the public understanding of how to combat inflation is growing. There is an increasing public realization that while we have an urgent short-run problem that requires great energy and effort, the real problem is that of the long pull. Direct controls of a sweeping over-all nature cannot be a policy of indefinite duration in a free country. The time may come when in an ultimate crisis we shall have to throw everything we have into the balance. If we reach such a point where it becomes quite impracticable to cover the cost of the ultimate effort by pay-as-you-go fiscal policies, we shall have to throw in the full armour of direct controls to buttress and support the more fundamental measures. But in these matters one cannot follow an in-and-out-and-in-again policy. It would seem sensible to hold these weapons in reserve for the critical moment.

In conclusion, what of our longer term outlook? There is at the moment a considerable gap between the military strength-in-being of our world and the Russian world. We and our associates in the free world will have to turn on a real burst of speed and divert a very considerable segment of our resources to building up our defenses and security in order to close this gap. In this energetic process we shall have to forego a lot of desirable and sensible projects of economic development. We may have to yield, for the time being, some of our recent or prospective gains in levels of consumption or in the enjoyment of leisure. When this dangerous gap has been safely narrowed down, we may well have to face a long and steady pull of indeterminate duration—perhaps 10 or even 20 years, in order to hold our position. Concurrently we may have to carry certain costs and responsibilities relating to assistance to the underdeveloped areas of the world.

But to my mind our longer range prospect is by no means gloomy.

We in Canada have within our borders great resources and great capacities, and in these respects we are not alone among free nations. Our capacity for growth, if wisely developed, can in due course build up our economy to a point where we can carry, if necessary, very substantial burdens of defense and security for an indefinite period, and at the same time still have a good deal available for increasing the levels of both consumption and welfare.

PRODUCTION AND DISTRIBUTION PROBLEMS UNDER DIRECT PRICE CONTROLS

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WHAT I have to say here will assume an economy in the present state of partial mobilization.

The country appears convinced that the number one economic problem is to stabilize prices and prevent inflation. This thought has become so thoroughly ingrained in our thinking that many have ceased to question it. It is a part of our economic doctrine.

In the early days of the Church, a complete code of religious doctrine was handed down to the laymen. There were some unbelievers who were called to account for their heresy. These unbelievers were permitted to have a spokesman to defend them. Since this spokesman was supposed to represent the powers of evil, he acquired the highly descriptive title, "The Devil's Advocate."

Similarly, today, the fear of inflation and an enthusiasm for price control have become a part of our economic doctrine. There are some who do not subscribe to this doctrine; I am among them. I should like to be the Devil's Advocate in defense of my own heresy and that of others.

Some will say that in view of political considerations, direct price controls are inevitable and that economists therefore should accept them and figure out how best to make them work. This is a view which I cannot accept. I recognize the need for synthesizing the view of the economist, the sociologist, the political scientist, the diplomat and the military expert at the *policy* level. I object to the idea of embarking on a policy based on political or other considerations and then asking the economist to rationalize and expedite this policy. I shall attempt to distill the *economic* considerations out of the current ferment; if too strong a drink comes out, the policy-makers can cut it with the appropriate amount of water. But let us not mix other disciplines with economics at the analytical level.

Flexibility Needed, Not Stability

First of all, in my judgment the number one economic problem is not that of controlling inflation, but of maximum production for the rearmament effort and for the economic well-being of our citizens. If we lose out to the enemies of freedom, it will not be because the price index showed a rise of a few points. The primary economic problem is to keep our economy flexible to meet the changing needs brought on by domestic and international developments. This can't be done with prices frozen,

any more than my car can be kept on the road with a locked steering wheel. The key word is not *stability*, it is *flexibility*.

Inflation Is a Symptom

Let us look at the chief charge leveled against inflation—that it reduces the buying power of the people and forces them to accept a lower level of living. It is certainly true that if we devote 20 percent or some other large percentage of our energy to the destructive efforts of war, we will have fewer useful goods and services to enjoy. How is this reduction in the level of living to be brought about? There are only three ways to do it:

One way is to take the money away from the people, either by taxing them or by requiring them to buy bonds.

Another way is to ration them and thereby limit the amount of goods they can buy.

Still another way is to let prices rise, thereby pricing consumers out of the market. These price rises may need to be supplemented by restrictions on the production of certain consumer goods which are not essential to the rearmament effort.

All three methods will achieve the purpose which is essential if the rearmament program is to go forward—reduce the level of living of the people and thereby transfer men and supplies from civilian uses to the rearmament program. The only question is whether this is to be done by a high level of taxation, by an arbitrary rationer in Washington, by the impersonal operations of a freely fluctuating price system, or by some combination thereof.

The real culprit responsible for the reduced level of living is the war effort; inflation is merely a symptom. Prices are to the economic body about what the temperature is to the human body. The human mechanism consists of various organs: the heart, the lungs, the liver, and the stomach. If something happens to one or the other of these organs, the temperature rises and is recorded on the thermometer. Similarly, the economic body consists of many parts—labor, agriculture, industry—each with its own supplies and demands. If something happens to the supplies of or demands for these commodities, the change is registered in the price.

A doctor could set the thermometer at 98.6 and think that therefore he had cured the patient. Similarly, we can freeze prices as of a certain date and think that we have cured whatever ailed us. A fixed thermometer would be a handicap to a doctor who is puzzled about how to diagnose and prescribe; a fixed price is a handicap to an economy which is trying to find out what to produce and consume.

Inflation is a good scapegoat; attributing our difficulties to inflation is a good way to draw attention away from the real cause of prospective reductions in the level of living—the rearmament effort. But let us not be so naïve as to think that if we halt inflation we will be able to avert the reduction in the level of living brought about by rearmament.

Inflation and Production

It is sometimes thought that a rising price level cripples the productive plant of a nation and therefore hampers the rearmament program. On the contrary, a rising price level is a powerful stimulus to increased production. When prices rise enterprise is encouraged. Debts are easy to pay. Inventory values rise, modernization goes forward. Business ventures pay out. The tremendous production of World War II was accomplished while the price level was doubling. In time of war, the price system has always invoked a certain amount of inflation as a stimulus to production and a deterrent to consumption.

Is Inflation Followed by Deflation?

Another charge against inflation is that a price rise must inevitably be followed by a price decline; the rise may be pleasant, but the collapse is painful. This notion is based on the idea that there is a sort of normal for the price level and that prices somehow have to fluctuate around that normal. This we have believed for a long time; it is implicit in the concept of "normal agricultural value" for farm appraisal, based on the period 1910-14. "What goes up must come down," we say, much satisfied with our wisdom.

But a study of history shows that there is no normal for the price level, that what goes up may stay up. After World War I, Spain's prices leveled off at several times prewar, and stayed there. After World War II, prices in the United States were two or three times prewar, and I personally doubt if they'll ever come back to the 1939 level.

As a matter of fact, there is the great likelihood that if we succeed for a time through direct controls in holding down prices we will have inflation later, when we take off controls. This occurred after World War II. In other words, if we impose price controls and at the same time keep pouring out more and more buying power we build up a larger and larger inflationary lake behind the weakening dam of price control. Inflation comes when the dam breaks or the flood gates are opened. We may fear to open the gates, and so continue to live in regimentation.

There is no assurance that if prices rise now, they must fall later. Neither is there any assurance that holding them down now would keep them from rising later.

Runaway Inflation?

Some people are afraid that unless we have price ceilings, prices will "go through the roof" and we would have runaway inflation such as Germany experienced in 1923 and Greece during World War II. I have studied many inflations in many lands covering a period of many years—the inflations of Austria, Russia, Hungary, China, Italy, Germany, Greece, and our own country during the Revolutionary War. I know of no record of any nation that underwent runaway inflation so long as its productive plant was intact. The only examples of runaway inflation that I know of occurred in countries ravaged by war, torn by revolution, or laid waste by some great disaster. Here again, inflation was a symptom of a more deep-seated cause.

It is a matter of interest that many of the countries which have undergone runaway inflation have done so in spite of a system of ceiling prices.

How Much Inflation Can We Stand?

How much inflation can a country stand? There are three different levels: the psychological level, the political level, and the economic level, each successively higher than the former. Much of the present confusion comes from failing to distinguish between them.

The psychological level is the one at which people start to complain about the rising prices. This is a very low level; an increase of a few cents a pound in the price of beef.

The political level is somewhat higher; it is the level at which the complaint about rising prices becomes sufficiently great so that Congress will do something about it. Maybe a rise of 10 percent in a year's time will bring about this reaction.

Finally, there is the economic level, the level at which the country's production is really harmed. I don't know where this level is, but it is very high. The doubling of our price level during the war was an aid to production, not a handicap. After World War I, Finland's price level was 10 times prewar, and she was prosperous enough to continue paying her war debt.

Inflation affects different classes of people differently, as everyone knows. Farmers find that their prices rise and costs lag; they like inflation. Laborers find that wages rise and jobs are plentiful; they like inflation. There is one important group which suffers during inflation—those on fixed salaries. Unfortunately this group includes newspaper editors, radio commentators, Congressmen, and professors of economics. These people talk and write all out of proportion to their numbers or importance, and are responsible for much of the furor about the evils of inflation. They find inflation harmful to themselves and generalize from their own experience.

A good measure of the reaction of the people to inflation is their be-

havior at election time. A satisfied electorate will not "change horses in midstream;" when the people are in distress they "turn the rascals out." In the 30 presidential elections since price data became available there have been only two occasions when people failed to maintain a party in power on a rising price level; with prices falling, there have been only two occasions when they failed to "turn the rascals out." Truman's election in 1948 was an upset in terms of the Gallup Poll, but not in terms of the price level.

To summarize, I doubt that the dangers of inflation are sufficiently great to cause us to scrap the price system and go in for direct controls.

The Functions of Price

It has become increasingly fashionable to doubt or deny that price can allocate resources or guide consumption. This is in spite of competent research to the contrary, and in spite of a rather efficient pattern of production and consumption which could have come about in no other way. One who doubts that price can guide production and consumption is an economic agnostic, like a physicist without a law of gravity or a theologian without a Deity. We have become so engrossed in some of the finer points of economic doctrine that we have largely forgotten economic lesson number one. We economists have been concentrating on end runs, double reverses and mousetrap plays instead of studying the fundamentals of blocking and tackling. Here are the functions of price as I see them:

Prices serve three functions. They tell us what to produce, they guide commodities through the channels of trade, and they tell the consumer what and how much to consume. If the price of hogs increases relative to corn, the farmer recognizes the consumer's request for more pork, and he responds accordingly. If the price of eggs rises in New York relative to Philadelphia, the egg trade recognizes the call for more eggs in New York and diverts eggs to the high priced outlet. The consumer, with her market basket on her arm, chooses food on the basis of price. If steak is high she buys hamburger, and if both are high she buys beans. One hundred fifty million people vote on their prices. Everybody serves on the committee that determines market prices, and serves without pay.

What happens when we hold these prices below the market level?

First, the consumer recognizes this as an encouragement to increase consumption, and cleans off the shelves.

Second, the farmer recognizes this as a sign to reduce production. So a shortage develops, and the scant supply must be rationed. This may not have been contemplated at the time the ceiling price was set, but given time, it follows as the night follows the day.

Finally, with artificially lowered prices, production continues to lag and subsidies must be resorted to.

Ceiling prices, rationing, and subsidies are the three-legged stool of an economy which endeavors to hold prices below the equilibrium level. A stool will not stand for any length of time on one or two legs, but needs all three.

In England they understand this better than we do, for they have been at it longer. They fix prices, ration, and subsidize agricultural commodities pretty well across the board; they have had to do this to make the system work. We will have a similar experience if we stay with it long enough. If we won't let the price system function we shall have to step in and do the jobs that the price system formerly did for us.

In the first act of the national melodrama, Price Freeze is the fair-haired hero who would save Little Nell from the villain, Inflation. But in Act Two, he must request the aid of that low character, Rationing, and in the last act the two of them must beg the help of that ugly fellow, Subsidies. If the audience knows all this and still wants to pay to see the show, well and good. But they had best not cheer too loudly or too early, when Price Freeze makes an entry.

The American citizen needs to know that he can't have artificially low prices (which he considers desirable) without rationing and subsidies (which he considers undesirable). It is a package sale. We do not know this, hence our enthusiasm for price control. The first effect of price control is to permit us to buy at a low price, which all consumers like. This continues so long as the momentum of our past production pattern will carry us. Then we get in trouble, and need to ration and subsidize. In time we feel the full impact of the program and are likely to kick it out. This cycle took about four and a half years under OPA.

Management Under Price Control

The job of management is to put together land, labor, and capital in an efficient manner so as to produce the goods and services asked for by the consumer. Prices are the critical items in these decisions. Prices tell the manager which products the consumer wants. Prices of land, labor, and capital tell him how much of each he should use in producing the commodities that are asked for.

When prices are fixed, the chain of command is broken. How can the manager tell whether the consumer should have beef or butter? If the price is effectively fixed all the manager can do is give heed to the fixed price. If prices of hogs and corn are fixed at a relationship favorable to hogs, management can only expand hog production in response to this fixed price until suddenly the country runs low on feed.

Prices may be calling for the proper product at the time they are frozen, but they don't stay that way. Along comes a short crop or a changing need, and the old ceiling is no longer the right one. Changes

are not made in time; it takes an administrator a long time to make up his mind that the ceiling is wrong, and still longer to correct it.

Black Markets

Most likely, prices would not be effectively fixed; there would be black-markets, gray markets, tie-in-sales, under-the-counter sales, kickbacks, upgradings, false counts, and short weights. These activities are viewed by some as outright violations of law and by others as an effort to reestablish the functioning of supply and demand. In a country like ours with a tradition of freedom and individual rights, nobody becomes very disturbed about two people getting together on a deal mutually satisfactory.

People display all sorts of reactions to violations of law. They'll help catch a kidnapper; they'll report a traffic violator, but won't try to catch him. What will they do and say about somebody who buys a piece of beef above the ceiling price? Many will ask "Where did you get it?" and "What did it cost?"

The cost of abiding by the law will be measurable in so much per pound whenever the farmer goes to market. For a certain percentage of people with firm respect and blind faith in law, the choice is easy. For another group—the greedy or the desperate—the choice is likewise easy. For most Americans, the choice is difficult. The prospect is not a bright one. Honesty and respect for law are virtues which are already frail enough so that one has no wish to see this extra burden and temptation placed on them.

Some people attribute difficulties of enforcement to incapable administration, to poor organizational setup, to excessively complex regulations, or to some special perversity of human nature. These changes may be partly true, but the difficulty lies deeper than that. It lies with suddenly declaring illegal operations which formerly were considered entirely moral and right. It asks a sudden changing of the value concepts with which people regard economic activity. Sociologists tell us that these changes come about slowly and only in response to some deeply felt need.

Would there be better compliance and a better job of enforcement in the years ahead than during World War II? We probably can't count on the degree of cooperation that existed then, when we were definitely at war and the people were behind the effort and in a mood to sacrifice. Furthermore, there is the possibility that the forthcoming effort might be of considerable duration, and the longer the period, the more the maladjustments that would have time to develop. What lies ahead may be a mile run, not a hundred yard dash. These two races should not be run in the same manner. A price freeze works better for the dash than it does for the distance.

An Alternative

Luckily there are alternatives to direct controls—taxes, which mop up buying power, and credit controls, which prevent the creation of new money. These take the upward pressure off the price level. If we had the courage to apply these remedies in sufficient degree, we could halt inflation and at the same time let the prices of individual commodities fluctuate freely.

I have tried to make these points:

First, that the real problem is maximum production of the appropriate goods and services, not inflation control. The beneficial effects of inflation have been much underrated, in my opinion, and the unfavorable effects much exaggerated.

Second, if a price freeze really comes—and what we've had now is not a real freeze but merely a cool spell,—then we become a nation of lawbreakers, wheedlers, scroungers and special pleaders. I am not saying that direct price controls will not work; I am merely saying that the cost of making them work might well be greater than the questionable benefits derived therefrom and greater than a free people would long tolerate.

Third, if inflation control is desired, there are better ways of accomplishing this objective than price freezes, namely, heavy taxation and credit control. We need not burn down the house to roast the pig.

I feel deeply about this because it seems to me that we economists have not done our job. We have not helped people to understand the workings of the price system, and this failure is about to cost us our liberty.

There is an intriguing phrase, "the point of no return." An aviator starts out on a mission with a certain supply of gasoline, and after a time may reach a point where he doesn't have enough gasoline to return to his base. This is the point of no return. Every flyer thinks carefully before he passes that point.

There can be, I think, a point of no return in economic affairs. We may start off on some mission, not too well conceived, and bumble about, issuing directives, patching the leaks and patching the patches until we pass the point of no return. Affairs will have then gone so far from equilibrium and the shock of return would we so great that we would lack whatever it takes to slough off the controls.

If we should pass the point of no return after a full appraisal of the advantages and disadvantages of our new position as compared with our old base, then we need have no grief. I believe in democracy and have immense faith in the soundness of *informed* public opinion. But if we embark on some program after considering only the short run implications and then find ourselves hedged about with unsuspected evils, so that we wish to return to our base but can't, that is a different matter. I feel strongly the need for economists to tell the public what's inside this hand-

some package labeled "direct controls." My guess is that if we were to go in for a full system of price controls and stay with it for 10 years, we would have passed the point of no return. Price freedom is the key to all other economic freedoms.

DISCUSSION

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This is not an easy paper to review. The author revels in deviating from the orthodox herd, whose views on inflation are held to be blind acceptance of blind dogma. The paper is larded with scholarly allusions—although the author seems not to know that the "Devil's Advocate" does not defend heresy but rather contests against sainthood. There are medical and historical analogies—even references to the dramatic arts, to college football, and to aviation—not clearly applicable to the problem addressed here. There is gross disregard of the difference between inflation with slack and inflation with full employment. There is a remarkable disregard of the actual scope of current price stabilization, of the methods used and of the orientation of price control to production needs. There is an elementary discussion of the functions of relative prices, well applicable with reasonable general price stability but quite meaningless in the frenzy of general price explosion such as prevailed late in 1950. To some of the points in this paper we may stipulate agreement: that defense production is a major goal; that inflation is in some senses symptomatic —although even the author will agree that inflation is a cumulative process in which worsening of the symptom engenders further illness; that most defense costs must be met currently; that price stabilization is neither the single nor even the best method to control inflation.

There are many statements in this paper which are attractively formulated and often partly true. The total impact is not persuasive to me. On the last page, there are three short summary statements purporting to encompass Mr. Paarlberg's entire case. I am unable to accept any of these.

First, Mr. Paarlberg holds that maximum production and not inflation control is the real problem—that the benefits of inflation are dogmatically underrated and the damage therefrom exaggerated by self-interested professional economists with fixed incomes. Apparent failure clearly to understand the determinants and the impact of inflation is general throughout the paper. The "chief charge . . . against inflation" is not that it reduces levels of living. To assert that "another way . . . [to control inflation] . . . is to let prices rise, thereby pricing consumers out of the market" is a fallacy in reasoning from the particular to the general. With general price stability, an increase in the price of a particular commodity will usually decrease its sale. A rise in general prices will not restrict the sale of commodities in general. Most economists consider that enhancement of the aggregate price level engenders enhancement of aggregate money income. Rising general prices can restrict total consumption only if wage distribution is rigidly controlled through forced allocation of wages to groups with consumption propensities lower than those of wage

* These are the personal views of the writer and are not necessarily those of the Office of Price Stabilization.

earners. This method of dampening inflation is surely impracticable in the present American economy. Further, such wage control in the "national melodrama" must be quite as objectionable to Mr. Paarlberg as that "fair-haired hero, . . . Price Freeze." Inflation is a price-income-price spiral. Rising money income without significant income redistribution does nothing to constrict total demand.

In an economy not close to full employment, a mild and gradual and unanticipated rise in prices is stimulating to enterprise and to production. This is not now nor will it soon be the kind of problem to which economic stabilization is addressed. There was a drastic speculative inflation a year ago. There are now firm defense commitments which almost certainly assure heavy inflationary pressure in the near future. Even without full-scale war, such inflation if uncontrolled would be neither mild nor gradual nor would its continuance be long unanticipated. The anticipation of price increases induces withholding goods from use. The more critical the defense need, the stronger would be the incentive to hold for further price increases. Rapid general price increases are irregular among commodities. Inefficient producers are not weeded out. Labor, materials, and plants may be diverted from essential defense uses. Sellers will not make long term contracts necessary to efficient planning of production. Wage renegotiation will interrupt production processes. Speculative cunning is rewarded at the expense of productive efficiency.

Economists agree that in normal times the free market best allocates resources. However, such allocation is achieved through changes in relative and not in general prices. The functions of relative price changes are impaired or destroyed when price rises are sharp and foreseen and are feeding upon themselves. Mr. Paarlberg would be startled to observe the dislocation of relative prices disclosed by the freeze of January 26, 1951. He would apparently be surprised to know that a major function of the Economic Stablization Agency is to repair these dislocations and to restore the effectiveness of relative price changes in guiding resource use. The freeze of January 26th was a distasteful necessity. Even so, inspection of the eighty-odd tailored regulations, as many supplements to the General Ceiling Price Regulation, the amendments to both, and other forms of regulation issued since January 26th would indicate beyond doubt that price stabilization is not price freezing. It is a continuous process of maintaining normal price relations as well as containing general price levels.

Mr. Paarlberg's disregard of the costs of inflation is amazingly cavalier. There is severe damage to national defense and to productive efficiency but there are also major social costs: impairment of the whole social fabric through destruction of middle class assets; creation of antagonisms from income redistribution; damage to saving propensities and to capital creation; deterioration of morale because of speculators' elevation in national emergency to the top income strata.

Mr. Paarlberg's second claim is that inflation may better be controlled by methods other than price and wage controls. All agree that direct controls should be only a part of the total attack upon inflation, but they are a necessary part in rapid mobilization. Effective direct controls encourage saving. They thus discourage speculative withholding and reduce the inflationary gap. Even if taxation and credit controls could substantially eliminate the inflationary gap, there would still be heavy and inevitable pressure in this full-employment economy for upward wage adjustments. We cannot in a mobilization economy

afford the unemployment which we normally tolerate and which serves normally as a brake upon inflation. Presumably, indirect controls limit wage and other income pressures by restricting money demand to the extent that employers can neither afford higher wage payments nor reflect wage increases in higher prices. However, the principal buyer of many strategic materials is Government. Here no such indirect control of wage and income levels is possible. And income increases in these fields would surely spread through the rest of the economy in the absence of direct control. Mr. Paarlberg could fruitfully examine the changes during 1950 in prices of rifles, tanks, aircraft, and other military equipment. He might well consider the implications of these price changes.

Third, Mr. Paarlberg holds that direct controls will surely transform Americans into a nation of traitors, beggars, law-breakers, wheedlers, scroungers, and special pleaders. I hold too high an opinion of Americans and of American Government to concur in this view. Fairly devised and honestly administered, an efficient system of direct controls can be enforced with only minor and temporary loss of individual economic independence—much less enduring and stringent than the loss of liberty from defeat by Communism. It is true that the public must understand the stabilization program and its obligations thereunder. I share Mr. Paarlberg's belief in democracy and his faith in the soundness of informed public opinion. The extent and impact of black markets in World War II have been greatly overplayed. Until June 30, 1951, techniques were available to control such black markets. The experience of our British allies demonstrates that intelligent and law-abiding nations can in fact endure prolonged control without destruction of moral fiber or personal liberty. And in doing so they can defend themselves.

I like controls no more than does Mr. Paarlberg. I look forward to the day when they can be lifted. Not long ago, all of us saw war. All of us now are in danger of a political force whose victory would mean far more serious results than price control. The American people have assumed terrible reponsibilities in their attempt to contain Communist imperialism. These responsibilities require us to accept the burdens of mobilization. They require us also to prevent the inflation which could as surely destroy us as could military defeat.

DISCUSSION

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The United States, as well as the other nations of the free world, have a very genuine interest in the economic health of Canada. Part of this interest stems from the natural desire to see a neighbor doing well, but the primary cause for this concern over Canada's welfare stems from the hard realization that Canada, with her vast supply of natural resources, is in a position to play a very important role in the current stand against Communism.

Mr. Taylor has pointed out in his paper that the most important domestic problem confronting the Canadian people is that of controlling inflation. He has then described the tools which the Canadian government has chosen to use in combating this enemy. Up to this point, reliance has been placed almost wholly upon a scheme of indirect controls—monetary, credit and fiscal controls.

My assignment was to discuss Mr. Taylor's paper. He has presented the case for indirect controls as clearly and concisely as could be desired. It is unfortunate, from the standpoint of a discussion, that I adhere to the same position as that taken by Mr. Taylor. I am in such wholehearted agreement with his paper that I shall not discuss again the points he has made.

While the majority of economists working in this area are on record as favoring the approach described by Mr. Taylor, the real proof of any program for controlling inflation lies in the degree of success attained by its application.

An interesting comparison develops from the fact that the United States has placed considerable emphasis upon a scheme of direct controls combined with its indirect measures, while in contrast Canada has relied almost entirely upon a program of indirect controls. Admittedly, it is difficult to make any quantitative measure of success achieved in stopping inflation. Nevertheless, there are some interesting symptoms which we can examine in comparing the results of the two approaches.

The effects of inflationary pressures are usually measured in terms of price rises. Two indicators commonly used in determining the degree of inflation are the index of wholesale prices and the cost-of-living index. Reducing these two indices for Canada and the United States to a common base—May, 1950—we discover two interesting features. First, the indices of the two nations have moved together for the most part. Canada's cost-of-living index has moved to a new high of 112 on June 1, 1951, while this figure for the United States has dropped slightly to 108. This is the greatest disparity since the Korean affair began. On the other hand, the index of wholesale prices for the two countries was exactly the same—117—on June 1, 1951 (May 1950 = 100).

The second interesting feature we find is that in both indices the Canadian price behavior has lagged rather consistently from one to two months behind the United States level.

What conclusion may we draw from this comparison? There appears to be little evidence here to comfort either the advocates of the direct or the indirect control schemes. Certainly Canada, using the indirect approach, has not been more successful than the United States. Rather than conclude that in this simple comparison we have shown indirect controls to be ineffective as compared with direct controls, I should like to make three observations.

First, we may have exaggerated the importance of the direct controls we have employed in the United States—it may well be that the effective inflation control has been in the area of the indirect measures. In support of this position let me submit two examples of what the indirect method has achieved since January 1, 1951.

The Federal Reserve Board announced in March that it would no longer support a "pegged" bond market. Immediately, many government bonds dropped below par, with the result that some of our large financial institutions, particularly those in the field of housing, found themselves committed to paper with a relatively unfavorable yield. This was so in view of the fact that it was necessary for these financial institutions to sell their government bonds at a subpar price in order to obtain liquid funds. The immediate reaction was a tightening of the money supply available for housing.

The effect of this move is well reflected in the fact that during the first five months of 1951 housing starts were at a rate of one million a year. Builders across the country are now freely predicting that unless the present credit

crisis is eased, and eased rapidly, the rate will drop to 600,000 during the second half of 1951.

A second example of what indirect controls have been able to achieve in this fight against inflation may be found when we examine the effective supply of money now in circulation. From January 1 to April 1, 1951, this total has dropped from $177 billion to $172 billion—a net decline of $5 billion. This sort of action, it must be admitted, strikes at the heart of the problem—the reduction of the amount of money available to be spent for our limited supply of goods.

It may well be, then, that the tools used by Canada and the United States in the fight against inflation are not different, but essentially the same.

The second observation I should like to make in connection with this comparison is that the Canadian Government has not, by her own admission, exercised her scheme of indirect controls with sufficient vigor. On July 1, 1951, a new personal and corporate income tax increase was made effective to buttress existing programs. Too, it must be recognized that the Canadian consuming public associates inflation control with price and wage control. They were conditioned to this during World War II. The new approach has undoubtedly appeared weak and ineffectual to them. This accounts for the continued period of dissaving, which has only recently been halted and reversed.

The third point which should be made is that the Canadian economic system is so thoroughly geared in with that of the United States that it is virtually impossible for her price levels to veer far away from those of the United States. This assumes, of course, that existing international trade conditions are not materially altered. Approximately 15 percent of all the goods she consumes are bought in the United States market, and about 15 percent of all the goods she produces are sold through this market. This is a significant part of her total product and quite naturally her price level cannot vary too sharply from that prevailing in the United States. Within rather broad limits, then, it may be said that, regardless of what action Canada takes to control inflation, her success in such an endeavor will depend largely upon what happens in the United States.

I have not discussed Mr. Taylor's paper as such. Let me repeat that it needs no discussion—it is a splendidly constructed presentation of the position held by the majority of economists today. Rather than discuss the paper, I have tried to paint a picture of the results attained under the scheme outlined by Mr. Taylor as compared to a combined system of direct and indirect controls as currently practiced by the United States. The results have been interesting but inconclusive.

This much can be said for the Canadian approach at this time—they have done about as well as the United States in their effort to contain inflation, and have done so with a minimum of interference with the operation of the "automatic" features of their economic system.

ECONOMIC PROBLEMS OF UNDER-DEVELOPED AREAS

Chairman: J. B. Rutherford, Department of Fisheries, Canada

CONDITIONS FOR ECONOMIC CHANGE IN UNDERDEVELOPED COUNTRIES

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I

IN THE last two and one half years—ever since President Truman in his inaugural message in January of 1949 called for a "bold new program" for assisting the undeveloped countries of the world—there has been an extraordinarily active discussion of the ways and means for promoting or facilitating economic progress in such countries. Text for this discussion has been provided by numerous studies of the requirements of individual countries and of national and international organizations for facilitating their development. The especially competent and comprehensive report recently published by the United Nations on *Measures for the Economic Development of Under-Developed Countries*[1] may properly be singled out for special mention. Indeed, so extensive has been the discussion and, by contrast, so comparatively slight the action on aid to undeveloped countries that one wonders if there are not some philosophers in these lands who, by now, are beginning to suppose that our interest in their problems is largely intellectual. Heavy and important claims are now being made on our resources and, in approaching any problem so intricate and even baffling as that of economic development, there is much to be said for a period of discussion, planning, and experiment such as we have just come through. Nonetheless, I confess to the view that the time for discussion of Point IV and its Commonwealth counterpart, the Colombo Plan, is now over, and the time for more determined action than we have yet witnessed has come. If such action is not possible, than we should terminate the discussion with the promises it implies. It is one thing to debate ways and means of helping a poor neighbor if one really intends to help him; it is something else again to have such a public inquest on his misery if he is serving only as an interesting case study in misfortune.

II

Having implied that little remains to be said on the subject of this paper and argued that not much more should be said, I am now in a position where I must ask my own permission to continue. Fortunately there is a

[1] United Nations, New York, May 1951.

tradition which allows speakers to be generous with themselves in such crises. There is one phase of the problem of development with which I would like to concern myself, which has had relatively little attention in the recent discussion. We have concentrated on the means for initiating progress and change in backward countries. We have looked, and perhaps properly, at the recognized instruments for effecting change—capital accumulation and investment, development and application of technology, education and communication—and at the problems and prospects of employing these instruments in the undeveloped world. While the issue has been by no means ignored, we have given far less attention to the underlying causes of stagnation and progress in such communities. As the editors of the London *Economist* observed a few weeks ago: "Quite remarkably little systematic inquiry has been made into the causes and conditions of economic progress, and nobody can claim to know what the factors are that must be present before the spiral can begin to revolve."

I do not pretend to have a knowledge of these factors and much less, in this paper, to provide a systematic catalogue of them. However, I am strongly attracted by certain common features of the undeveloped countries which stand out in sharp contrast with those that are characterized by change. And certain of these empirical observations can be readily assimilated to the theory—more accurately perhaps to the logic—of change. The remainder of this paper is given to a discussion of the characteristics, common to the undeveloped societies, which suggest at least a first step toward a theory of stagnation.

The first and very commonplace observation to be made about the undeveloped and unprogressive countries is that they are all agricultural. It is evident, moreover, that there is a broad association between industrialization and change. There is no industrialized or substantially industrialized country in the world which can be said to be stagnant; there are, of course, many agricultural countries that can be so described.

It is possible to go a step further and say that, with exceptions of a rather special character, a purely agricultural country is likely to be unprogressive even in its agriculture. This is obviously not true of the temperate zone agricultural countries of the new world—Canada, a generation ago; New Zealand, today—where western Europeans found extensive and little used land resources and a climate fairly similar to that to which they were accustomed. But it would appear that where a pattern of agricultural land use has once been established—when, speaking roughly, settlement is complete—industrialization is a powerful force for inducing change and development, even in agriculture. In western Europe in the eighteenth and nineteenth centuries the great improvements in agricultural methods and management proceeded almost in pace with the Industrial Revolution. The most spectacular agricultural

development occurred in England, where industrialization also went farthest. In eastern and southern Europe, in the areas unreached by the Industrial Revolution, agriculture remained unchanged. No one would suggest that farmers of England, northern France or the North German Plain farm as their ancestors did 500 years ago. This is a commonplace observation concerning southern Italian, Greek or Balkan agriculture. The same comment can be made, with even greater accuracy, of the settled but nonindustrialized areas of the Middle East, India and southeast Asia.

Moreover, the relation of industrialization to agricultural change in the settled country is reasonably direct. In such a country, especially if it is densely populated, the scope for agricultural change is sharply circumscribed by the land system and the relation of the people to the land. This framework can be, and normally is, far more important than any change that can occur within it. Given a rigid and perhaps exploitive tenure system, the fragmentation of land into small holdings and a continuing struggle by many people to make a living off limited land resources—all commonplace features of settled countries—the opportunities for change are surely very few. Most modern technology is excluded; there are likely to be few or no alternatives to the current crop or crop and livestock combinations.

The agriculture of such an area, in more precise terms, has already found its highest equilibrium of resource use, given the resources, and particularly the superabundant human supplies, which it must employ. This may be, and often is, at a very low level of welfare. And the nature of this equilibrium, coupled with the rigidities of the tenure system, is such that most of the opportunities for technological change—change of the kind that has increased the productivity of North American agriculture—are precluded.

This situation, as I have said, is a common place one. The Puerto Rican cane worker, who ekes out a miserable and undernourished existence, is nonetheless associated with an agricultural system which represents something very close to the optimum use of the land and labor resources of the island. Were he engaged in producing any crop other than sugar, his real income would be even lower. Many of the opportunities for technological advance—the mechanization of cane harvesting, for example—are ruled out by the very plenitude of the labor resource of which he is a part. This same low optimum—decreased further by the rigidities associated with small and fragmented holdings—undoubtedly characterizes the agriculture of India, the countries of southeast Asia and other parts of the undeveloped world. I would not wish to rule out all possibilities for change within this context of resource availability and tenure. We have heard much, in recent times, of the gains from using even simple Western hand-

tools in Asian agriculture. I believe, however, that we should appraise such change carefully. It may be change within a context of continuing poverty.

If I have correctly identified the character of this equilibrium, the obvious escape from it is through the development of alternative economic opportunity. This means industrialization. The effect of industrial development in this context is that of a combined population, land, and market reform. In its full development, industrialization lessens the immediate pressure of population on land resources. It also enables or even requires a change in tenure and land systems to adjust to a lower intensity of labor use. And it provides the markets for a new range of production alternatives. Not only are opportunities for technical advance created but so, also, are strong incentives to such advance. We have here, in other words, an exceedingly comprehensive force for agricultural change. It was the kind of change enforced upon English agriculture at the time of the Industrial Revolution and the second enclosure movement. It is the kind of pressure which—as Professor Schultz has described it in somewhat different terms—industrialization has kept on the agriculture of the northern United States for nearly a century and which, primarily expressed through labor shortage, we are now seeing applied to such areas as the Southeast and the Mississippi Delta.

I should like to digress here for one practical observation. Since the end of the war, and especially during the last year or two, there has been some distress among those who have been working on the problems of the backward countries over the emphasis which governments of these countries place on industrialization. These governments have not infrequently been told that some of the enthusiasm they manifest for steel mills and hydroelectric plants might better be directed toward hybrid corn and pesticides. Without doubt there has been a world-wide tendency to identify progress with Pittsburgh and to neglect the commonplace in favor the grandiose. Yet it is apparent that we should not be too unqualified in our criticism of this drive. There may be more substance to these ambitions than we have supposed. More even of our own agricultural progress may be identified with Pittsburgh than we have guessed.

III

To establish an association between industry and change—or between lack of industrialization and stagnation—represents at best but modest progress on the tasks of this paper. I can hardly claim to have been dealing as yet with final causes of stagnation. Admitting that industry is a touchstone of change, why do many countries, rich in resources and amply supplied with manpower, remain primitively agricultural? Why does industry develop in some areas and not in others?

In our time there is a certain view of historical causation—that which attributes great changes to a man, great results to a battle and (with the modern exception of the Yalta Agreement) great settlements to a conference—which has become deeply suspect. This same suspicion of seemingly too simple explanation has placed a ban on considerations of climate and geography in explaining economic development. No self-repecting scholar may say, for example, that a country is backward because its climate is hot and unhealthful.

Yet when one looks at the undeveloped areas of the world he cannot escape a striking fact. To an extraordinary degree the problem of underdevelopment is a problem of the equatorial world. There are important undeveloped areas outside the tropics. But if one marks off a belt a couple of thousand miles in width encircling the earth at the equator one finds within it *no* developed countries. The industry, such of it as there is, is extractive—tributary to economies farther north or south. The agriculture, excepting a substantial amount of plantation culture, is also primitive. Everywhere the standard of living is low and the span of human life is short. Surely all this is not an accident.

We have on the North American doorstep, in the islands of the West Indies, a problem in development which strongly suggests the unifying role of climate and geography. The land resources of these islands are, by any usual standards, quite rich—the British crown long set a higher value on these islands on the fringe of the tropics than on the bleak settlements on the Atlantic seaboard. The human stock shows great diversity as between the islands. Some islands are nearly pure African; some are nearly pure European; in one or two there is an American aboriginal strain. The islands have had every kind of political tutelage from the orderly if unimaginative evolutionary policies of the British to the incredibly incompetent and corrupt autocracy of Spain. Some have had nominal—and a considerable degree of practical—independence for more than a century. Yet the common feature of all, black, white, or brown, independent or colony of Britain, France, Spain, or the United States, is extreme poverty and—the heroic efforts of the Puerto Ricans are among the few exceptions—continuing stagnation.

I do not pretend to know the reason for the association that appears to exist between climate and geography on the one hand and a low level of welfare and progress on the other. I do suspect that, as a result of some combination of biological and psychological factors in his adjustment to his environment, man has not yet fully mastered the problems of a highly technological existence in the tropics. There is a strong and long-standing conviction that man will always conquer his environment, however recalcitrant that environment may be. So far as the tropics are concerned, this ego-serving belief may need reexamination.

IV

As I have said, an exercise of the kind on which I am here engaged raises a difficult problem is disassociating cause from effect. We are all aware that capital is necessary for development. But is an ample supply of capital the cause of development or is development, as I rather suspect, the result of the determination of a community to go forward and to provide the incentives to domestic saving and the security to home and foreign investment which insure it a supply of capital? We know that resources on which capital may operate are necessary, but there is a wealth of evidence—especially from the tropics—which shows that resources are not a *cause* of well-rounded development. Likewise there are countries—Israel is a striking modern example—where a meagre endowment of resources does not inhibit development. Investment in human beings, especially in education and health, is obviously necessary to progress. However, in the United States and Canada and elsewhere in the western world, investment particularly in education has been inspired, in very large measure, by an appreciation of its relation to progress. In brief, back of what may be called the instrumentalities of change, there must be a strong and effectively expressed desire for change.

This brings me to the character of the government of the country. If we look at the countries that have been characterized by great change in the last century we will find that they have all had avowedly popular government. They have not all been parliamentary democracies—although the greatest changes have been associated with this manifestation of popular government. However, they have all been governments, even in the case of dictatorships, which have made serious claims to governing on behalf of the people. In contrast, and equally without exception, the areas of stagnation have been those that were subject to colonial domination or where a domestic oligarchy has made, at most, only a shallow pretense to serving an interest beyond its own. I know of no backward country which can be said to have had a truly popular government.

There are excellent economic reasons why change should be associated with, and confined to, popular government. Material progress is to the advantage of the masses of the people. If they are in command of their political destiny, or if they are of sufficient political consequence so that dictators can remain in power only by their claim to serve mass welfare, there will be progress. But progress does not necessarily reward the colonial power or the domestic oligarchy. It may, on the contrary, be positively damaging and even dangerous to them. Landlords in backward countries, if they see clearly their interest as some have the undoubted capacity to do, will not welcome the industrialization that will make their labor independent and expensive. The merchants who man the tollgates

at the ports of the Caribbean and South American countries do not want modern methods of mass distribution which would promptly bypass them. The soldiers who infest the political life of the South American republics would be quickly returned to barracks by the business classes and the labor and farm movements that effective economic development would bring.

In the past few years we have somehow managed to persuade ourselves that all of the governments of the world want economic progress. This is undoubtedly true of the great masses of the people of the world. But we should not suppose that the lip service that members of their governments pay to these aspirations reflects, in all cases, a genuine desire for change. In important parts of the world—in much of South America and the Middle East and elsewhere in Asia with such great exceptions as India—governments are still the property or the puppets of small groups whose future security may be not with progress but with stagnation. It is idle to hope that these groups will misinterpret or ignore their own short-run interest and become reliable partisans of progress. Evidently this is part of the lesson to be drawn from the recent misadventures of American policy in China. Currently in Iran we are apparently seeing a wealthy land-owning caste channeling the grievances of the masses into a virulent nationalism which has become in effect an attack on economic development.

What I have just said has a special application to the much discussed matter of land reform in the backward countries—a subject in which, as agricultural economists, we have a special interest. As to the importance of land reform in many of the countries of which we are talking there can be no doubt. It is a prime requisite of social stability and of progress in agricultural methods and technology. In many cases it is a condition precedent to a successful Point IV Program. No one should expect to interest a farmer in improved strains and varieties of crops and livestock, in improvement of his farm plant or in the employment of more and better equipment if he is surrendering three fourths of his production—and a like share of any increase—to landlords, usurers, and tax farmers. The Communists have learned that in the backward countries the promise of land is their most efficient method of winning converts—instead of rescuing mankind from what Marx once called the idiocy of rural life, the modern Marxist offers the local equivalent of 40 acres and a mule.

Unfortunately, some of our current discussion of land reform in the undeveloped countries proceeds as though this reform were something that a government proclaims on any fine morning—that it gives land to the tenants as it might give pensions to old soldiers or as it might reform the administration of justice. In fact, a land reform is a revolutionary step; it passes power, property, and status from one group in the community to

another. If the government of the country is dominated or strongly influenced by the landholding groups—the one that is losing its prerogatives—no one should expect effective land legislation as an act of grace. It will occur, if at all, only as it has occurred in Japan, Korea, and on Formosa under the extreme force of circumstances and, perhaps, under extreme outside pressure. The world is composed of many different kinds of people, but those who own land are not so different—whether they live in China, Persia, Mississippi, or Quebec—that they will meet and happily vote themselves out of its possession. The best assurance of land reform, which I for one hope can be orderly and peaceful, is a popular government by those who really want reform.

V

At this point it would be natural for the listener to inquire if I haven't proved too much. Are not the forces making for stagnation overwhelming? What possible hope can there be for progress in, say, a nonindustrial country in the tropics governed by the agents of a small property-owning class?

In the eighteenth and nineteenth centuries English philosophers—Adam Smith, Malthus, Walter Bagehot—were inclined to regard progress as abnormal—a peculiarity of the English-speaking world and its periphery. Perhaps we have swung too far in the other direction in regarding change as normal—as a problem overcoming resistances, great or small, which however will surely be overcome. Yet on the side of the modern optimism, if it may be called that, is the undoubted desire of people the world over for change. This is surely the greatest assurance of change. In the great struggle which now divides the world, it is also the assurance of friendship for those who facilitate progress by deeds, not words.

SOME PROBLEMS INVOLVED IN TRANSFERRING TECHNOLOGY TO UNDERDEVELOPED AREAS

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WE LIVE in a world about which it is dangerous, if not indeed foolhardy, to generalize. The problems of different peoples in different areas are highly specific. Region by region around the world, and even locality by locality, the social mores of the people, the cultural compulsions, and the economic motivations are characterized far more by variation than by conformity to any generalized pattern. In large part the same is true in the application of scientific and technical knowledge, and would continue to be true even if the problems with which the social scientist concerns himself were not complicating factors. For example, an improved corn for a specific locality in the High Plateau of Mexico cannot be developed in Iowa. The comparative climate, soils, crop pests, and other biotic factors are much too divergent. To be sure, the same science of genetics is used. And simply to work with the corn one does not necessarily have to learn a new language or acquire insight into new philosophical and cultural systems. But the genetic science—or it might be soil science, or entomological science, or other—must be applied against an intimate knowledge of local environmental conditions. And even phenomena which can be classified as readily as can physical and biological environments cannot be generalized on any but the broadest of regions. I think we can state as a principle, possibly having behind it almost the force of a natural law, that the problems of technological transfer and of development are local and specific, and will remain so. In the economic advancement of the countries we now choose to call the developed ones, this principle has been apparent. Surely it is not likely to be less true in countries where much development is yet to be achieved.

On this point it seems to me important to recognize that when we speak of developed and undeveloped areas we are not contrasting absolutes. As a maximum we can refer only to degrees of difference. There is no such thing as a fully developed country or area, nor can there be while science and technology remain dynamic. On the other hand there are few if any wholly undeveloped areas. The capacity of any area to produce is always a function of the science, technology, and corresponding capital applied to the resources to which it has access. Even the resources are not a constant, but rather they expand and stretch as a basis for production in relation to the science and technology applied to them. Consequently, even the presently most developed regions have in store potentially greater development from the further application of existing scientific knowledge and from new scientific discoveries yet to be made.

With respect to those areas now less developed—such as the countries containing the half of the world's population which has annual incomes of less than $100 per capita—we are essentially concerning ourselves with shortening the lag period between scientific and technological discovery and its application to local production problems. Some writers have recently suggested that an adequate body of technical knowledge already exists, if and when it is applied, to meet in full the world's production needs. I suppose, in fact I believe, that this statement is entirely correct, as far as it goes. It is a statement which makes good reading, which can capture headlines, and in which many persons seem to take much comfort. But it does not solve the production problems nor reduce the existing widespread poverty. It minimizes or ignores the applied research through which the science may be adapted to locally varying conditions. It passes off with a shrug the complex cultural and economic problems which may be the most serious deterrents to actual application.

Scientists have long been prone to believe that there are no effective boundaries around knowledge. Except for restrictions demanded for security purposes, this idea is essentially correct—within the limitations of the relationship of scientist to scientist. The major languages are widely read, publications are easily exchanged, and international congresses of scientists are commonplace. But communication only between scientist and scientist is not enough. In development problems our real concern is the dissemination of knowledge to the actual producer on the farm and in the shop. And here we run head on into the fact that the understanding and application of science are generally found to exist in inverse ratio to the degree of ignorance, illiteracy, and superstition among farmers and other workers. Scientists, even very able ones, may live and work in any area, including those much underdeveloped. But if they have little or no communication with the actual producer, they make little contribution to his production problems.

Unfortunately, the greater part, if not indeed all, of the less developed regions of the world have been handicapped by what have been essentially aristocratic education systems. Perhaps this is one of the most important of all reasons why these areas have remained underdeveloped.

In a society where only the specially privileged can get an education, the educated few become a caste apart. This is based largely on the exaggerated respect extended to educated persons in practically all parts of the world, and stems from the time when only a churchman or an aristocrat could obtain an education. Being of a superior caste, the educated person looks down his nose at artisans and tradesman, and especially at farmers. He has come so far from the necessity of grubbing his own food that anything so menial as he regards farming to be is beneath his dignity and largely beneath his notice. His position demands that he must

not get dirt under his fingernails or grease on his clothes. To suggest that he ought to get manure on his boots and barley beards down his neck would be rank insubordination.

Consequently, where aristocratic education has prevailed (aristocratic in fact if not in name) the educated person could talk only with another educated person, the scientist only with another scientist. Because they were remote from actual production problems, the scientists turned to pure science. Some of the world's finest work in pure science has come out of countries or social groups where formal schooling was in effect denied to all but the economically or socially privileged few. But generally speaking, the application of that science has been made largely in the more developed countries, where much more nearly universal education has prevailed; where the son of any family, however poor, has had access to education limited only by his own capacity and drive; and where, having acquired scientific training, he has applied it to the production problems of his own people who remained on the farm or in industry.

Unfortunately, education of the aristocratic type is still a major problem—to my thinking, one of the most serious problems—in the development of the underdeveloped regions. Even in countries where significant starts have been made in bringing young men from the lower social strata and from the agricultural villages into the technical schools and universities, the great majority of these trained persons do not go back to their people. Their education sets them apart. It weans them away from their families and their villages. Instead of applying their training directly on the farms and in the small industries of the area from which they came, a discouragingly large proportion take ineffectual jobs in ineffectual government offices.

The tragedy of this is obvious. A lack of trained personnel, working in an environment and under leadership which stimulates scientific applications, is one of the great handicaps of the underdeveloped regions. Moreover, the technically educated persons of these areas are generally better trained in textbook theory than they are in production practice. I believe one of the services of greatest permanent value which the more developed countries can render to the less developed is to concentrate on extending the training of promising young scientists from the underdeveloped regions, and to instill in them a new scientific motivation toward practical application of their training. A major lesson, perhaps one of the most important that a majority of these young men need to learn, is that both physical work and dirty hands have dignity. In the final reckoning it will be national rather than visiting scientists who must carry forward the greater part of the basic improvement work if resource development and changing production practices are to be continuous.

Development does mean change. And that fact, so commonplace to us

that we accept it as a matter of course and without question, is another of the difficult problems in the technological advancement of many underdeveloped areas. People in general, but especially farmer folk, who have lived for generations in an environment characterized by little change, who follow religiously the methods and practices of their forebears, tend quite naturally to look upon change with misgiving. Our agriculturists and scientists, for example, when visiting in such regions are quite prone to conclude that these native farmers are tradition-bound and slow to change even to the point of obstinacy. It can help us a great deal, both in understanding and in helping them, to recognize that a majority of these people proceed from an entirely different motivation than do our farmers. The major part, although certainly not all, of the farmers of the less developed areas operate essentially to feed their families directly from their farms rather than to sell in the market place. Profit is not their motivation nearly so much as is survival. Their little crops of basic food stuffs are their very existence. They know that if they do not harvest they will not eat. Thus, they seek not the biggest crop but the surest crop. Their most haunting fear is that things will get worse, and to their way of thinking a change in their production methods may have precisely that result. We must recognize that their thought is not so much: "If it was good enough for grandfather and father it is good enough for me." Much more nearly it is: "Father and grandfather, and the generations before them, each survived by doing it this way. Thus, I am here. If I do things the same way, I will survive—and my children after me, if only they will follow the time-proven methods." Vastly more generations of men have been stimulated by this motive than by black ink in an account book. The majority of the farmers in the less developed areas, especially the small operators, still respond essentially to this stimulus, and for this very sound reason make changes slowly and cautiously. It ill behooves any technologist who starts out to aid them to be impatient with their ideas—and he will not accomplish much in the way of development if he is.

A cautious native farmer is not quickly interested, as our commercial farmers are, in an improved seed stock which may have shown marked promise in the experimental field. And again, in terms of his survival motivation, there is good reason. He wants to know not only what the crop might have done this year or in any one year, but he wants also to know what it would do in other years when climatic, or soil, or pest conditions might be highly adverse. He intuitively hesitates to make any break in the biological balance of his present farming system.

Perhaps the simplest way to express this thought is to note that when Nature is left to her own devices in plant and animal selection she creates a balanced biological community. Each kind of plant, for example, either must have or develop tolerance to the environment in which it grows,

including adjustment to such complex factors as climatic variations, soil conditions, animals, insects, and diseases, or it cannot survive, and passes out of the picture.

I have become convinced that long continued native agricultures are essentially expressions of this survival-of-the-fittest selection. Soils long abused, often by single cropping and without any adequate maintenance of fertility, attain a balance of productivity—low level, of course—with the climate, the crops grown, and the cultural practices. The crops, struggling over the many years in a less-than-favorable environment, come into balance—again at a low level of yield potential—with the soil, the cultural practices, the cold or heat, the wetness or drought, the insects, and the plant diseases. Even the farm practices, primitive as they may seem to farmers from a more progressive environment, become actually a part of the balance. And the pests and diseases, uncontrolled as they appear to be to another farmer raised with seed treating equipment in one hand and a sprayer in the other, are in fact controlled with no small effectiveness by the time developed balance of biological and physical factors in which they exist. To be sure, generation upon generation of native farmers have selected, however haphazardly, against the adverse factors and in favor of their crops. Though the result is a low-yield farming system, it does attain an important degree of year-to-year certainty.

To make some breaks in this balance, as for example by the introduction of new crop types, without following through to meet the many faceted additional requirements for a new balance, could result in ineffective or even disastrous changes. Any newly created farming system could be worse than the old, or better by a little, or far superior, depending directly upon how fully the multiple essentials of a new and higher level biological balance are supplied.

This seems to me to be an important principle which underlies agricultural development everywhere. It brings sharply into focus the breadth and balance of the research program required in highly scientific commercial farming. Even more forcefully, it emphasizes that scientific and technical changes in the less developed areas can never be a one-shot effort. Rather a continuing and expanding process of change is essential. Whenever the scientist and the farmer have once made a break in a natural biological balance, they are forever thereafter trying to create a new and better balance in order to realize upon the gains already made. This new balance is always a goal. It is never an accomplished fact because the goal always recedes with each further scientific gain. The first improvement upon nature might be said to start a chain reaction of essential additional improvements and never afterward, assuming development is to continue, is there any stopping place in the process of more scientific research and more application of the research results.

Obviously, and fortunately, in the vast underdeveloped areas no fully blown program of research and extension is necessary as a place of beginning. Very real contributions can be achieved from a humble start if the work is carefully conceived and directed first toward those conditions, extremely variable from one place to another, which are presently most limiting to production accomplishments. But it is only to be expected that even small beginnings may take hold slowly among the uneducated and superstitious peoples of the least developed regions. Anthropologistsis have learned that the first change in the traditional practices of ancient folk cultures is the most difficult to make. Subsequent changes come more easily after a first break with tradition has been successful.

But certainly many regions of the world in which further development is a pressing matter are much advanced beyond this extreme level of primitiveness. Characteristically, these are areas where the process of change is already established, and where further change and improvement is at least willingly accepted, if not eagerly sought, by a significant proportion of farmers and others. Under these conditions, the problem of maintaining an *economic* balance in the farming system is perhaps fully as complex as the problem of the biological balance. Development does lead inevitably to a need for reapportioning the factors of production. But reapportionment is properly to be seen as a delicate rather than a gross adjustment. Correspondingly more farm equipment and less hand labor may be desirable as nonfarming opportunities for employment increase, but such changes are seldom if ever rapid enough to justify a broad jump in farming equipment from a sickle to a combine or from a hoe to a tractor.

Many developing countries and regions seem to me to be placing exaggerated emphasis on farm mechanization compared to the work they are doing on readily applicable biological science. Machines may sharply increase labor efficiency, but to what end, where farm labor is superabundant and opportunities for nonfarm employment are exceedingly limited? Applied science by contrast may bring sharply increased yields from the available land area—and land in most of the regions we are talking about is much less abundant than labor.

This overemphasis on mechanization became apparent to me in the plateau region of central Mexico where I observed these problems at first hand. The Mexican farmers tend to look across the Rio Grande and say, "Where the American farmer is mechanized, he is prosperous. Therefore, we will be prosperous if we have similar machines." What these farmers aspire to especially are tractors and tractor tools. They do need improved implements, but for the most part they do not need tractors.

The most common agricultural implement in Mexico is still the wooden plow. It is used with mules on some farms but more typically with oxen.

This plow is hardly more than a crooked stick affair, made with no iron or steel except perhaps three or four pounds on the point and a clevis at the end of the beam. It has no moldboard, but merely breaks the soil and pushes it to either side. The Mexicans call it the *arado egypto*, or Egyptian plow. It was introduced centuries ago from North Africa into Spain and was brought by the Spaniards to Central America where for 400 years it has remained unchanged. In 1940, according to the census of that year, 60 percent of the plows in Mexico were of this type.

By going three or four times over a field this plow will break the ground for planting, but except under very favorable conditions it does not prepare a good seed-bed. Small steel turning plows now made in Mexico to sell for the peso equivalent of $9 to $10 will do a much better job of preparing a field for seeding. A new wooden plow costs only a quarter as much, but an equally important reason why many Mexicans stick to the wooden plow is that they use it for cultivating corn and other row crops as well as for plowing. Two new tools, and sometimes three, are necessary to replace it: a turning plow, perhaps also a shovel plow, and a steel cultivator. Cultivating corn with the wooden plow involves running it close to the row, where in mellow soil it digs five to six inches deep and shears off the side roots of the plants. The two or three steel tools already mentioned, and perhaps also a small steel harrow, should quickly pay for themselves through increased yield resulting from better seed-bed preparation and reduced crop injury.

Tractors in central and southern Mexico, even on the few large farms, have to compete with abundant and very cheap labor which at present has little alternative opportunity for employment if it is displaced from agriculture. Consequently, any widespread use of mechanical power would present both economic and social problems. On Mexico's two million small farm units (less than five hectares of cropland) the typical operator, even with his present methods, has only 160 to 200 days of productive work a year, and no excessive labor peaks. That is, he is already much underemployed. If tractors were brought in, even on a cooperative or hired basis, some work which the operator and his family now accomplish—in a laborious fashion to be sure—would become a cash expense which could not be offset by other productive work.

The point here emphasized, for Mexico and many other similar countries, is that improvement in their farm equipment is much to be desired, but does not necessitate supplanting crude tools with tractors. Mechanization may proceed in shorter steps, from sickle to scythe for example—a step which many Mexican farmers have not yet made. Merely the fact that certain tools have given way to bigger and faster ones in some countries where labor has become extremely expensive does not mean that other farmers in other circumstances should jump from their present implements

across the intermediate steps to where a few highly mechanized farmers now are. Again this is a point difficult to generalize, but the equipment improvements most needed in the still underdeveloped regions are ones which will make possible better seed-bed preparation or in other ways increase the crop yields, rather than tools essentially designed to save labor.

The argument is often advanced that areas with a great deal of developmental catching up yet ahead of them fortunately need not go through all the intermediate steps experienced by the regions now more developed. In many ways this is a reasonable expectation. But certainly with respect to equipment adoption it may be argued that a much sounder proportioning of the production factors will result if the machinery advances are more moderate than rapid. And may I repeat that in many circumstances I think mechanization can easily be overemphasized relative to the essential advancement in biological science.

Obviously it is to be expected that farmers shifting for the first time to a commercial type of operation will be much perplexed and often clumsy at the task of maintaining a rewarding economic balance in their business. Blending the costs of land, labor, equipment, and production supplies into a grow-it-and-eat-it system of farming is quite a simple matter in comparison with the same problem in commercial agriculture. And it cannot be overlooked that, inevitably and unavoidably, development does mean a shift toward commercialization. Furthermore, a very large part of the problems involved in transferring technology center in this fact.

Development means a trend toward new seed stocks, new methods of pest control, chemical fertilizer, and an increased use of tools. Thus, it means increasing contact with other farmers and with nonfarm industry. It forces the farmer increasingly into the market place. It leads to new dependence upon transportation and communication. It substitutes a cash economy for the prevalent and traditional barter system. All this is commonplace to us. But it was not to our grandparents and great-grandparents a hundred years ago. We tend all too easily to forget what a prolonged and laborious process was the transformation of our own agriculture into a commercialized, mechanized, and reasonably scientific system. In consequence many of us are prone to expect changes to be accomplished in the still underdeveloped areas much more rapidly than is at all likely to be the case. Those who think there might be as much as a doubling of living standards in any significant part of the less developed regions in as little as one to two decades are letting wishes be father of their thoughts.

I feel compelled to mention two other problems before closing, both of which are worthy of extended treatment. The first of these is the problem of credit.

A shift in agriculture toward more commercial production invariably

requires capital. But capital is scarce in the less developed regions, and usually farmers have very limited access to what is available. People unaccustomed to handling and using money are not the best type of risk for a lender, and need much supervision if their loans are to be productive and pay out. Moreover, loans of this type are of small size and exceedingly expensive to service. Even from interest rates which to us seem usurious there may be little net return to the lender. In consequence, industrial developments almost invariably can bid the limited capital supply away from agriculture so that farming improvements are starved for capital and retarded as a result.

The other problem to which I wish to make reference, even though it has to be in an equally brief and unsatisfactory manner, is the deadening and retarding influence of the rigid social and economic institutional pattern which characterizes many of the underdeveloped regions. Where the institutions by which men live are highly flexible, they tend constantly to adjust to the changing social and economic motivations and objectives of the people. Such an institutional pattern is an evolutionary one. It imposes the minimum of drag upon economic and social changes.

By contrast, a system of rigid institutions—for example in land tenure, in education, in occupational choice, and the like—has a seriously retarding effect upon social and economic advancement. Whether or not we like the thought, this problem is an impediment to development in precisely the places where the need for development is most pressing.

Checking back over this paper I had the disturbing feeling that it sounds pessimistic. That certainly was not the intention—my objective was only to be realistic. That developmental changes will come slowly is only to be expected. I repeat that they came rather slowly, in the sense that they took decades rather than merely years, in the now more developed countries. But changes do come, and they can be aided, but not accomplished overnight. From any one year to the next they might be difficult to see or measure. But the hopeful note is that developmental changes may grow like the compound interest table, with each year's gain compounded to what has gone before. Even a low rate of increment builds up imposingly in this process.

DISCUSSION

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Dr. Galbraith suggests that the Point IV Program is directed primarily towards countries characterized by economic stagnation. He objects to the word "underdeveloped" since it is applicable to many of the high income industrialized nations. He argues that the countries characterized by economic stagnation need industrial development first rather than agricultural improve-

ment, despite their overwhelming dependence on agriculture. In examining their failure to industrialize to date he concludes that industrialization does not occur in a tropical climate, regardless of the resources, racial composition, or type of government. He further concludes that a popular government or a benevolent despotism is a necessary condition for economic change and progress, and that land reform and a wider distribution of ownership of the factor of production and political power are essential elements of material progress.

What generalizations would the Incas or the Romans have offered as they looked at the economic future of the North American Continent or to Gaul, Britain, or Germany in Northern Europe? It is likely that they would have argued that the cold climates, severe winters and inability to establish stable, well-organized political systems were serious handicaps to the development of these areas. Only in the warm climates did they have the resources, the technical progress, and the organizing genius needed for a comparatively high level economic system. Certainly it was true that innovations moved northward from these areas. Corn, potatoes, beans, and a variety of vegetables were selected and developed by the Incas and Aztecs and distributed through them to the temperate zones. Our debts to the Romans in legal concepts, architecture, and other things are well known.

Against this background we must view Dr. Galbraith's suggestions as an attempt to characterize recent historical trends. As such it has considerable appeal. We might raise questions of detail, such as the nature of the governments of Argentina, Turkey, Japan, and particularly the Soviet Union during the early stages of change and industrialization. Were they in fact, governments "which have made serious claims to governing in behalf of the people?" However, my major comment on the paper concerns the implication that since economic stagnation has been and is the dominant characteristic, that it will continue to be so. Even if we do conclude that the probabilities favor his argument, this period of world tension precludes neglecting any opportunity to draw these poor nations into our economic and political orbit. Let us view these obstacles as hills to be surmounted, not as mountains which turn us back.

In order to save time and space, let me enumerate a few major comments as specific points.

1. Lest I be misunderstood in that which follows, let me accept Dr. Galbraith's suggestion that a favorable political, economic, and social climate aids greatly in facilitating change. It is a basic assumption of the Point IV Program that economic development is desirable and that the peoples of the world want rising levels of material well-being. Thus it is assumed that measures necessary for this goal will be accepted even though it requires land reform, changes in the distribution of income and political power, mass education and/or innovations in production techniques. That economic progress is desirable is a common sense Western idea but is not so clearly accepted by many Eastern peoples. How to make the ideal of economic progress more universally accepted is definitely one of the problems which technical assistance programs must face.

2. There is considerable indication that technological progress for the tropics is growing in importance. Technical and economic progress in Europe and North America has been particularly adapted to the climate, more level and fertile lands and resources of the temperate zone. Have these developments

of the past two centuries (a brief moment in the history of Man) been inevitable or merely happenstance? Of course, once the process was started, the accompanying cultural revolution helped it to feed upon itself to bring about the amazing increases in material welfare which we are enjoying today. Other areas were left behind in the backwash as areas of economic stagnation. Schultz argues along this line in his *Reflections on Poverty in Agriculture.*

Perhaps such a sequence is just over the horizon for the rough lands, the poorer soils, and the tropical areas of the world. Recent developments in insect control are primarily a matter of comfort as far as man in the temperate zone is concerned, but mosquito and fly control in the tropics means the difference between life and death, or at least between good health and debilitating endemic sicknesses. It also means much to the physical condition and rates of gain of animals in the tropics. The development of a livestock industry in Florida is suggestive of the possibilities. We could go on to contrast the potentially greater impact of nutritional knowledge on the average worker in the tropics, of fertilizer use on the poorer soils around the world, or the application of plant breeding to tropical plants. It is reported that coffee trees have been developed which produce not 25 or 40 percent more but eight to 10 times more per tree than trees now producing.

3. In many countries agricultural development must precede or accompany industrial development. Let me quote one paragraph from the United Nations report cited by Dr. Galbraith:

> It is thus clear that there is no need to choose between developing agriculture and developing industry; both must be pursued. In countries which are short of labor the way to industrialization lies through the improvement of agriculture; while in countries that have a surplus rural population, the way to the improvement of agriculture lies partly through the development of manufacturing industry. In either case, both must figure largely in any development programme.[1]

I wonder whether our speaker was unduly impressed with the problems of India and China and gave little consideration to areas like Africa, Turkey, and South America. Without agricultural development, countries may find themselves in the position of Venezuela, with heavy food imports, an inadequate agricultural plant, and little foreign exchange and domestic capital available for industrialization, despite their large exports of petroleum.

One other point on industrialization is pertinent. The most logical type of industry is one which processes the raw materials produced for domestic or foreign consumption. Yet if products are processed for exports, a higher tariff is usually charged by the United States and other industrial countries. So agricultural nations turn to protective tariffs to stimulate production of items they normally import!

4. Recent gains in the terms of trade must be used for the benefit of the entire economy. Increases in the prices of rubber, tin, wool, and other raw materials have brought large increases in income and foreign exchange to their producers.[2] This further encourages the concentration of economic effort

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[1] United Nations, *Measures for the Economic Development of Underdeveloped Countries,* New York, May 1951, p. 59.

[2] If Malaya and Indonesia export at the same rate in 1950-51 as in 1949 the exports would earn three times as much foreign exchange for the former and twice as much for the latter country, an increase of a billion and a half American dollars. Onno van Teutem, "Economic Impacts of Defense Mobilization on Selected Countries," unpublished master's thesis, Michigan State College, 1951.

on the specialized export products, which may well be in keeping with long and short run comparative advantage, provided the traditional price instability can be mitigated. An opportunity is provided for economic advances if (a) import prices rise less rapidly, and (b) the rest of the nation can somehow capture part of the increased incomes for domestic capital formation. This means one of two alternatives. The recipients of the higher prices may save a substantial part of their increased incomes for domestic investment and increase the usually low proportion of consumption represented by savings. However, it is more likely that the State through fiscal measures must capture and use the added income for needed capital investments. This is one aspect of liberal government which is important in the first point listed above. Moreover, adequate use of these funds will reduce materially the amount of foreign capital needed. An important source of capital formation in an underdeveloped agricultural country is the returns from agriculture.

5. Another important aspect of industrialization is the impact on the birth rate and population. Expanding production in the past has led to increasing population in the underdeveloped areas and rising levels of living in the industrialized areas. How we move from the first case to the second is a serious problem. Is there any way in which social and economic planning can be conducted which will provide positive checks on population growth without waiting for a large degree of industrialization? Furthermore and more important, is control of population a goal which will be acceptable to the underdeveloped countries?

One final remark: The pessimism which Dr. Galbraith feels concerning the areas of the world with low per capita incomes is similar to that which some have had towards the problems of Quebec or southern United States. In many respects, the problems are similar. In recent years we have found means of stimulating progress, not as fast as we might like, nevertheless, change is occurring both in agricultural and in industrial development. I see equally cogent reasons for being hopeful about doing something to help move some of the underdeveloped countries off dead center. But it is not a task which will be accomplished today and tomorrow. It is a process which will take time, and alternations of progress and retrogression. We must view economic development in terms of the broad problems the world faces today, not as economic development alone. The cleavage of the world into two armed camps has made at least one decision clear. We are going to try to improve the economic situation in the less industrialized areas as a matter of self-preservation. The question is not whether we should, but rather what are the most appropriate ways and means of doing so. If we are to play our role in the world it is incumbent upon us to strive to encourage the forces which lift men above the levels of simple existence and give them everywhere an opportunity to control their destinies.

DISCUSSION

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Professor Galbraith has developed a strong case for industrialization as a *sine qua non*—or almost that—for economic changes and emergence from agriculture stagnation in agricultural countries. He points out that where a

pattern of land use has been established and when settlement may be considered complete, industrialization appears to be one of the few forces capable of inducing changes and development even in agriculture. Undoubtedly experience in the developed countries supports this thesis. I think we must recognize, however, that in that experience industrialization as we know it was made possible by the exploitation of untold land and other resources, and when there was no great population pressure in relation to the area that contributed to its development. Moreover, it was accompanied by substantial and continuous migrations from the more heavily populated countries to other areas. The world is not so big now and populations are larger than was the case when many great foundations for industrial development were laid. That is not to say that industrialization cannot be an important key to economic betterment in countries with undeveloped resources, including overpopulated countries from which migration may be restricted and where stagnation has prevailed. It does suggest industrial limitations in some of the more important of them. That the people in such countries are conscious of some possibilities has been made abundantly clear by the urgent and eloquent representations of their delegates for capital assistance at every international conference where economic improvement in underdeveloped countries has been discussed.

Granted that industrialization has been and will continue to be a force for economic change in stagnant agricultural countries, is it not the case that because of other revolutionary world changes new forces have emerged or old ones have become revitalized, and either or both may be sufficiently potent to induce far-reaching economic change? Whether the world will be able to feed itself in years to come has emerged again as a subject of much discussion. What the answer may be may not be relevant at the moment, but the fact is pertinent that present food production is not sufficient to provide satisfactory comparable levels of nutrition for the peoples of the world. It may be stated, perhaps, that before the last world war such comparable levels of nutrition were not a world issue, but population increases together with political upheavals and associated developments since the war have made them such. People in the lower levels have become acutely aware of their position. One outcome of this is a widespread urge as well as a demand for more food. Is it not likely that this development may prove a potent force for change in the production of food, if these people are to help themselves with the assistance that others can give them? To the extent that industrialization can be added, progress will be accelerated and extended. The inference from these premises is, what can be done within agriculture itself?

No sooner does one begin to segregate something in the maze of factors to be found in underdeveloped countries than entanglements appear. Such stubborn and complex obstacles as land tenure, employment, capital, custom and illiteracy immediately present themselves. We frequently hear that what is needed is to take the "know how" of the developed countries to those in the underdeveloped category. While not without substance, such proposals ignore the constant danger of oversimplifying the problem. If rationalized sufficiently, they may help to simplify procedure.

I regret that I did not see Professor DeGraff's paper before arriving here last evening. His general theme as I saw it was that all measures for the improvement of agriculture must be adapted to the specific conditions which obtain and then applied with due regard to special difficulties that can be recognized. He seemed to think that his counsel of moderation and limited expectations in

the early stages might seem pessimistic. I should like to assure him that to me it did not. To me, it was just candid caution and frank recognition of actualities.

I sometimes think that we are too apt to consider the approach in terms of the ultimate we would all like to envisage. We are apt to think of revolution instead of evolution and that, I submit, is a dangerous concept for agricultural development. The gap between the primitive and the advanced in agriculture is too great to permit rapid, complete transformation. Our own history and experience should teach us that. In our own countries we have not yet completely overcome all the obstacles I have mentioned. We have seen the force of industrialization in full play, but it has taken virtually the lifetime of many of us to see the reaper replace the cradle and the scythe and, in turn, be replaced by the self-binder and the combine. The same is true of the unit of power. The formidable obstacles within agriculture itself in the underdeveloped countries will yield to treatment only in the course of time. We can hardly expect early industrial development such as we have enjoyed. Must we not therefore examine what practicable measures can be taken now and in the immediate future, how and where they can best be taken to bring the greatest help in the shortest time to people in need, and which ones can be made to serve as foundation stones upon which an extended structure can be progressively developed? This, it seems to me, is one of the major questions implied in Technical Assistance under the United Nations. It is the question which FAO is trying to answer. FAO has no monopoly of talent in any of its many ramifying fields. It has, in comparison with many national agricultural agencies, only meagre resources. It cannot hope for anything like adequate answers without enlisting not only the interest, counsel, and cooperation, but also the active participation, of many highly qualified and experienced workers from the ranks of such organizations as this one.

As you are aware, all undertakings by FAO under the United Nations Technical Assistance Program are subject to request by an eligible country. A project does not become operative until a contract is signed by FAO and the government of the country concerned, under the terms of which the government is committed to use its own resources in providing all local facilities and services that can be employed and that may be necessary for implementing the contract. At a meeting of the Council of FAO held last month in Rome, the Director-General reported substantial progress in concluding agreements for projects with a number of governments. The prompt response from countries for help in their food and agriculture difficulties and their ready participation in measures to overcome them is surely not without significance. They are more than an indication of the urge that exists among their people. They are a manifestation of at least some determination for action.

MANPOWER REQUIREMENTS OF AGRICULTURE

Chairman: T. K. Cowden
Michigan State College

MANPOWER REQUIREMENTS OF AGRICULTURE DURING THE NEXT TEN YEARS

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MANPOWER is a key factor in the present defense program of the United States. Full and efficient use of the Nation's manpower supply is of first importance in any defense effort.

Agriculture's traditional role regarding manpower has been twofold: (1) Farm workers have produced needed food, fiber, and tobacco for the domestic population and the Armed Forces and for export, and (2) Agriculture has supplied workers to the nonfarm economy, and in time of national emergency, has helped to man our Armed Forces.

During World War II and the postwar years, agriculture fulfilled its manpower role in a remarkable fashion. Volume of farm output and productivity of farm labor rose to record levels. Several million workers went from farms to nonfarm employment during the last decade. Natural increase in the farm population of working age was a more important factor than the release of workers from farm employment in this regard, however.

The current defense program means that agriculture's manpower resources are again facing a challenge. If the defense program continues and we have a high-level economy during the next decade, what is the farm manpower situation likely to be at the end of the period? How many workers will agriculture need? These are the major questions discussed in this paper.

Several questions must be answered before an estimate can be made of the manpower requirements of agriculture a decade hence. The more important of these questions are as follows:

(a) What volume of farm output will we likely produce by about 1960?

(b) What will be the future trend in productivity of farm labor and how is this likely to be accomplished?

(c) What departures from past distributions of labor, other resources, and production within agriculture, among regions, and among farms of different sizes are likely to take place?

An examination of past trends in production, labor inputs, and productivity, and especially the technological foundations for the trends, will

provide the best basis for answering most of these questions. It should also be emphasized that a high-level economy and full employment conditions will be assumed in looking ahead. In addition, the current high level of cash farm incomes means that farmers are in a position to continue rapid adoption of improved farming practices.

How Measure Manpower Requirements?

Before proceeding to an examination of past trends in output, labor productivity, etc., it seems desirable to discuss the problem of measuring manpower requirements of agriculture. Two measures are commonly used—farm employment and man-hour inputs. These supplement each other in several important respects. Man-hours are more sensitive to variations in production than farm employment. Man-hours per worker and production per hour are components of production per worker. Variations in man-hours per worker indicate changes in the degree of underemployment of farm workers.

Owing to the nature of farm production, data on man-hours are necessary in order to analyze adequately variations and changes in labor productivity. Farm employment can be related only to total agricultural production because most farm workers devote their efforts to many enterprises. Thus, it is not practicable to estimate employment in production of corn or wheat. However, estimates can be made of farm man-hours used in producing these and other commodities.

Both measures of labor input are used in the analysis presented in this paper. The Bureau of Agricultural Economics has made comprehensive estimates of man-hour inputs in agriculture for the country as a whole, for broad regions, for family-operated farms of specific types, and for groups of products. These data are used in examining trends in productivity of farm labor, labor requirements, and the underlying forces responsible for these trends. Finally, in looking ahead over the next decade, an attempt is made to translate projected man-hour inputs into farm employment. The BAE series on farm employment is used for this purpose.

Trends in Farm Output

Now to proceed to the first question posed regarding trends in output and production levels a decade hence.

During World War II and the postwar years, a veritable revolution took place in farm production in the United States. Output of farm products for human use in 1948-50 was a third above the prewar average of 1937-39 and nearly two thirds greater than at the end of World War I.[1] Farm output increased at an average annual rate of three per-

[1] Use of 1937-39 as the prewar base largely eliminates the effects of the drought years on the comparison made.

cent during World War II. This compares with a rate of increase of slightly more than one percent during the interwar period.

Changes in farm technology were primarily responsible for the upward surge in output during World War II and the postwar years. Increased mechanization has contributed significantly to the long-time rise in farm output. The shift to use of mechanical power on farms released more than 30 million crop acres from producing feed for farm horses and mules to producing products for human use during the interwar period. This factor alone accounted for nearly half of the increase in output of farm products for human use from 1919-21 to 1937-39. The upward trend in mechanical power was accelerated greatly during and following World War II. Between 1937-39 and 1948-50 the number of horses and mules on farms decreased by seven million, or 46 percent, while the number of tractors rose by more than two million, or 159 percent. This released 22 million crop acres, and accounted for about 18 percent of the increase in output during the period.

Although the continuation of the shift from animal power to mechanical power was a significant factor in the wartime and postwar upward surge in farm output, the bulk of the increase came about through increases in crop production per acre. Acreage of cropland showed little change between 1937-39 and 1948-50, but crop production per acre rose by more than 20 percent. More favorable weather than in the prewar period was an important factor in the rise in crop yields, but the bulk of the increase occurred because of greater use of fertilizer, improved seeds such as hybrid corn, more timeliness in cropping operations owing to increased mechanization, and other improved cropping practices.

Greater livestock "yields" also were of importance in the rise in output during the last decade and a half. More milk per cow, more eggs per hen, and an increase in livestock production per breeding unit in general has been the pattern. The number of breeding units of livestock also increased substantially.

Changes in output between 1937-39 and 1948-50 varied somewhat by regions, but the national picture described above was more or less duplicated in each major region of the United States. Output rose most rapidly in the North Central and Western Regions of the country and showed the smallest increase in the South. Percentage increases between 1937-39 and 1948-50 ranged from 16 percent in the East South Central States to 45 percent in the West North Central States.

Crop production per acre rose in all regions from 1937-39 to 1948-50, ranging from a 16 percent increase in the Middle Atlantic States to 34 percent in the West North Central Region. Acreage of cropland changed very little in the Northeastern, North Central, and Pacific Regions, increased considerably in the Mountain States, and decreased by eight to 15 percent in the three Southern geographic divisions.

An examination of production trends on 16 types of commercial family-operated farms reveals substantially the same picture as for the United States as a whole and the major geographic divisions. Output on most of these farms has increased considerably since the beginning of World War II and a rise in crop and/or livestock yields has been a dominating influence in most cases.

This brief examination of past trends in output and underlying causes points up two conclusions which are significant in any appraisal of future trends in output and labor requirements.

(a) The shift from animal power to mechanical power on farms in the United States has been a very great factor in the rise in farm output over the last generation. However, except in the South, the force of this output-increasing factor is now largely spent. There were 6.8 million horses and mules on farms on January 1, 1951. It may reasonably be assumed that the number will eventually stabilize at about four million. If this proves to be the case, another eight to nine million acres of cropland would be released, and two to three points added to the index of farm output. This represents a potential increase in output of less than two percent above the present level.

(b) Larger crop yields were the dominant factor in the upsurge in output during and following World War II. A rise in livestock production per breeding unit also has been of major importance in getting the needed expansion in output of meat animals and animal products.

Additions to our cropland base through irrigation, drainage, and clearing will contribute to future expansion in farm output in the United States. But further increases in output, especially during the next decade, will probably rest chiefly on continued increases in crop and livestock yields. This will mean even greater use of fertilizer, better seeds, and improved farming practices.

Various studies of the production capacity of agriculture indicate that, with average weather and favorable prices, volume of farm output can at least be kept abreast of market demands for some time to come. And this can be done without materially changing present patterns of consumption.

What volume of output will we likely need a decade hence, say by about 1960? Several long-range projections have been made in BAE. A volume of output about 55 percent above the prewar 1935-39 average appears likely if the volume of agricultural exports continues near recent high levels. Accumulation of emergency stocks and greater emphasis on aid to friendly nations could push the index to 160. This level could easily be reached, as indications based chiefly on the July 1951 report of the Crop Reporting Board are that farm output this year will be 146 percent of the prewar average.

Trends in Labor Productivity and Labor Inputs[2]

Output per hour of labor on farms in the United States is now nearly double what it was at the end of World War I and half again as great as in the years just before World War II. An increase in volume of output, rather than a decrease in labor input, has been the dominant factor in the upward trend in productivity of farm labor. From 1937-39 to 1948-50, for example, man-hour productivity rose 44 percent as the result of an increase of 32 percent in output and a decrease in man-hours of only eight percent. The picture was much the same during the interwar period when output per man-hour rose 35 percent, volume of output increased by 23 percent, and total man-hour inputs dropped eight percent.

The story is substantially the same in most of the major regions of the United States. Output per man-hour has risen most during the last generation in the North Central States, but all regions of the country have registered large gains. Man-hour productivity rose sharply in all regions during and following World War II. Increases from 1937-39 to 1948-50 ranged from 23 percent in the Pacific Region to 60 percent in the West North Central States.

Greater volume of output has overshadowed the decrease in labor inputs in each region. A decrease in man-hour inputs was about as important as the increase in output in the wartime and postwar rise in man-hour productivity in the South Central States. The Pacific Region has been unique in that it is the only one in which the trend in total man-hour inputs has been upward. The growing importance of labor-intensive crops has been the chief factor in the increase in man-hours in this region. The decrease in man-hours has been relatively small in the Mountain States also.

This same general picture of changes in man-hour productivity, labor inputs, and volume of output is substantiated by studies of trends on commercial family-operated farms. Increases in labor productivity on most of these farms have come about mainly from greater volume of output and to a much lesser extent from a decrease in labor inputs.

Greater efficiency of labor in farming in the United States has not been accompanied by large reductions in total labor input. Outstanding savings have occurred in farm labor *per unit of output,* with comparatively moderate reductions in the *total amount of labor* used in agriculture. The chief reason for this is that most of the developments that have raised labor productivity have also increased the volume of output per farm and in total. An examination of the major factors responsible for the rise in labor productivity supports this conclusion.

The chief single factor in the long-time rise in productivity of farm

[2] Most of the factual material in this section has been taken from U.S.D.A. Tech. Bul. 1020, *Gains In Productivity of Farm Labor,* December 1950.

labor has been progress in mechanization. Greater use of mechanical power—tractors, motor-trucks, and automobiles—has keynoted the growing mechanization of American agriculture during the last generation. A growing list and increasing numbers of modern labor-saving machines have been used on farms as tractor numbers have mounted. To be sure, expanded use of many of these machines has released workers from agriculture.

For example, migratory crews of combine operators have taken the place of the large numbers of seasonal workers who formerly helped harvest the wheat crop in the Great Plains Region. Similarly, mechanical corn pickers now do the job previously handled in part by seasonal hired workers.

Although mechanization has brought about significant savings in farm labor, it has also been a powerful force in increasing the volume of farm output. The shift from producing animal power in the form of horses and mules, corn, oats, hay and pasture, to buying power in the form of tractors, trucks, automobiles, and petroleum products has been, as was noted previously, a major factor in the long-time rise in volume of farm output.

The large increases in crop and livestock yields outranked progress in mechanization in contributing to the outstanding rise in productivity of farm labor during World War II. Greater yields of crops have raised man-hour productivity because the increase in man-hours per acre due to larger yields has not been proportional to the increase in yields. Preharvest labor per acre is spread over a larger volume of product. Man-hours used in harvest do not usually increase proportionally as much as do yields, particularly in the case of crops whose harvest operations are largely mechanized. Similarly, more production per cow, per hen, or per breeding unit in general raise man-hour productivity because labor inputs do not rise as rapidly as production. Greater yields of crops and livestock thus increase total output and output per man-hour, but do not decrease total labor inputs.

An examination of differences in trends in output and productivity by major groups of farm products also affords some clues to the future trend in manpower requirements of agriculture. The rise in man-hour productivity in crop production since World War I has been roughly twice that in livestock production. From 1919-21 to 1948-50, production of crops increased 38 percent, man-hour inputs in crop production declined 21 percent, and crop production per man-hour rose 74 percent. Over the same period, output of meat animals and animal products went up 62 percent, man-hour inputs in livestock production increased 15 percent, and man-hour productivity rose 40 percent. During World War II and the postwar years, however, increases in labor productivity in livestock production

have compared much more favorably with those in crop production. About 30 percent of the total labor inputs in agriculture are now devoted to production of livestock and poultry for human use. And demand for livestock products will continue to increase in the years ahead. This points up the importance of future changes in labor productivity in livestock production to future manpower requirements in agriculture.

Food grains and feed grains have outranked other farm products in past gains in labor productivity. Direct man-hour inputs on these crops have decreased significantly during the last generation, and have accounted for a substantial part of the decline in total labor inputs in agriculture during the period. Direct farm labor used in production of food grains and feed grains now accounts for only 15 percent of total labor inputs of agriculture. Production of these crops is generally well mechanized at present and further decreases in man-hours devoted to them are not likely to affect total labor inputs of agriculture significantly.

The cotton crop also accounts for a large part of the decrease in total man-hours in agriculture since World War I. This has occurred chiefly because of a decline in acreage, however. Man-hour productivity in cotton has risen much less than the average for all crops, with a good share of the gain coming about through a rise in yield. Cotton production in 1948-50 made up about 12 percent of the total labor inputs in agriculture.

The next decade may see a greater reduction in labor inputs on cotton than on any other major farm enterprise. The extent to which this proves to be the case depends upon progress in mechanization, especially mechanical harvesting, chemical and mechanical weed control, and the extent of shifts in areas of production. Rapid strides have been made in mechanizing the cotton harvest in California, where it is estimated that a third or more of the 1950 crop was picked with mechanical pickers. Use of the mechanical cotton picker has spread much less rapidly in the South. Full employment conditions and a rapid "pull" of workers to industry would greatly encourage the further adoption of mechanical pickers in the South.

The large reduction in numbers of horses and mules on farms during the last generation also has accounted for a major share of the decrease in total farm labor inputs. This has been partially offset by the extra labor required to maintain and service the additional motor vehicles and machinery on farms. Future decreases in labor inputs for the country as a whole through reduction in numbers of horses and mules will be relatively insignificant compared with past savings from this source.

This brief examination of the relationship among past trends in output, labor inputs, and labor productivity reveals a general pattern for the United States as a whole. Volume of farm output has risen substantially,

as has productivity of farm labor. Total inputs of farm labor, on the other hand, have declined moderately. Technological progress has been the chief force behind these trends. Large increases in fertilizer, lime, mechanical power, machinery, and production inputs other than farm labor were necessary for the great expansion in volume of farm output. This was graphically illustrated during World War II and the postwar years. From 1937-39 to 1948-50, volume of output rose by one third, farm production inputs other than labor increased by about 50 percent, and man-hours of farm labor decreased by only 10 percent. In this process of expanding output, other production inputs were substituted for farm labor. The substitution took place in the sense that a slightly smaller quantity of farm labor was able to handle a significantly greater volume of output. Looked at in another way, an important aspect of the wartime and postwar "revolution" in farming has been the transfer of part of the production job from farm to nonfarm workers engaged in the manufacture, transportation, and servicing of machinery, petroleum products, fertilizer, and the host of other items so important to present-day farming.

Judging by past trends, how much farm labor is likely to be needed a decade hence if we have a volume of output 155 to 160 percent of the 1935-39 average? Such a level of output would be 12 to 16 percent above the 1950 index of 138. A decline of around five percent in total man-hour inputs from 1950 to 1960 would be in line with past trends. This would mean a further rise in output per man-hour of about 20 percent during the decade. This projected increase in man-hour productivity would be at an average annual rate about half as great as during World War II.

With a high-level economy and full employment conditions, farm employment is likely to decrease more than total man-hour inputs over the next decade. Average annual employment on farms may drop to 9.3 millions by 1960, a reduction of 10 percent, or one million, from 1950. Reports for the first six months of 1951 show farm employment about four percent under the corresponding period for 1950. However, with a large cotton harvesting job in prospect this fall, the reduction for the year as a whole is not likely to be as large as four percent.

It should be emphasized that the projection of a decline of one million in average annual farm employment assumes the maintenance of a high-level economy and full employment conditions over the next decade. If this should not be the case, and nonfarm job opportunities are limited, a much smaller decrease in farm employment would occur.

Farm employment declined more rapidly than man-hour inputs during World War II. Prior to World War II, as an aftermath of depression, there was a large pool of underutilized manpower on farms. The more rapid decrease in farm employment than in man-hour inputs reflected

the elimination of much of the underemployment of farm labor in existence just before World War II. Farm employment increased slightly for two years following the end of the war, while man-hour inputs continued their moderate decline. Employment has declined since 1947, and in 1950 both employment and man-hour inputs were about 10 percent less than in 1935-39.

Distribution of Labor and Production by Size of Farms and by Regions

Despite the inroads made on the pool of underutilized farm labor during World War II, available data indicate that a considerable amount of underemployment existed in agriculture at the end of the war. This condition still exists. What possibilities are there of further reducing underemployment in agriculture during the next decade? How would this change the projection of farm employment based on past trends in output, productivity, and labor input?

According to the 1945 Census of Agriculture, part-time and nominal units represented slightly more than a fourth of the 5.8 million farms counted that year. Less than four percent of our total farm output came from these units, but they had about 14 percent of our total farm labor resources.[3] Most of the income of people on the part-time and nominal units comes from sources other than farming; hence, on most of these farms there is no particular problem of underemployment of labor during periods of high-level economic activity. But workers on these farms are counted in the farm employment estimates. The number of part-time and residential units has been increasing and is likely to continue to increase in the future. This will contribute to a future increase in farm employment under present definitions.

Nearly a million, or about one sixth of the total number of farms in 1945, were classified as small-scale farms. These farms contributed slightly more than four percent of the total output, and used nearly 14 percent of the farm labor resources. The underemployment problem is greatest on the small-scale farms. Indications are that the number of these farms decreased at a faster rate during World War II than did the number of commercial-family farms. This contributed to the decline in total farm employment during the war, and undoubtedly also to the decline since the war.

The projected decrease of one million in total farm employment between 1950 and 1960 allows for a further reduction in number of small-scale farms, as well as a continued decrease in number of commercial family farms. Presumably, the reduction in number of small-scale farms could be accelerated by intensive programs designed for this purpose.

[3] For an analysis of productivity by economic classes of farms, see *Sizes of Farms in the United States*, U.S.D.A. Tech. Bul. 1019, July 1950.

However, there is no one solution to the problem of underemployment on small-scale farms. More intensive production, combination of farms into larger units, part-time farming, and migration to nonfarm work are all possible alternatives. But the social and economic obstacles to these possible adjustments on small-scale farms are not too well known or understood. Further research is needed before an accurate appraisal can be made of the potential labor supply these farms might furnish to the nonfarm economy.

Although small-scale farms are found in considerable numbers in most parts of the country, they are relatively most important in the South. This accounts in part for the comparatively low level of productivity of farm labor in the Southern Regions. In 1948-50, for example, the three southern census regions accounted for more than 50 percent of the farm employment, and about 45 percent of the total man-hours of farm labor, but only 30 percent of the farm output of the country. During World War II and the postwar period, however, farm employment declined at a faster rate in the South than in other parts of the country. This situation is likely to continue under full-employment conditions.

The importance of the problem of farm underemployment was pointed up in a recent staff report to the joint Congressional Committee on the economic report entitled, "Underemployment of Rural Families." In this report it is estimated that full employment of underemployed farm operator families at average rates of production would add the equivalent of 1.6 million workers to our total working force.

On the basis of these estimates, all or a large part of the projected decline of one million in farm employment between 1950 and 1960 could be accounted for by migration of workers from low-production farms, or the actual decline in employment during the decade could greatly exceed one million. It seems likely that neither of these alternatives will be fully realized unless large-scale programs of occupational readjustment are undertaken.

Greater productivity on existing farms, increase in size of farms, and employment off the farm are the avenues usually suggested as means of reducing underemployment. We do not presently have adequate information as to the characteristics of underemployed farm workers, their resources, or their attitudes toward possible alternative uses of their labor. Hence, it is impossible to make a reliable estimate of the rapidity with which such adjustments should be encouraged. Nor can we know how much emphasis society will want to place on encouraging these adjustments. But we do know that increases in size of farms that involve combination of units will probably come slowly. Many workers on low-production farms may, for various reasons, be reluctant to move to nonfarm occupations. Even increasing productivity on present farms will have

to combat problems of lack of knowledge, credit, etc. All in all, the projected decrease of one million in farm employment probably is large enough to include the migration of farm underemployed that is likely to occur by 1960.

Conclusions

At the beginning of this paper it was stated that agriculture's traditional role regarding manpower was twofold: (1) farm workers have produced needed food, fiber, and tobacco for domestic use and export, and (2) agriculture has supplied large numbers of workers to the nonfarm economy. Substantial gains in labor productivity, with only moderate declines in total labor input, have keynoted the fulfillment of the first role. The conclusion was reached that the past pattern of expansion in volume of output with moderate declines in employment will continue in the future.

Agriculture's second manpower role has been more independent of the first role during the last decade than is sometimes recognized. From January 1, 1940, to January 1, 1949, for example, the total net farm-nonfarm migration in the United States was 6.1 million. Natural increase in farm population, excess of births over deaths, totaled 3.6 million during the same period. It is estimated that during the 1940 decade the natural increase in number of farm persons 20 to 64 years of age was about three million. During the same period farm employment decreased by 1.3 million. Although increasing efficiency in farm production during the period made possible a significant flow of workers to the nonfarm economy, natural increase in the farm population of working age was more important in this regard.

POLICIES AND PROCEDURES TO FACILITATE DESIRABLE SHIFTS OF MANPOWER

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IN ECONOMICS, and especially the economics of agriculture, we have failed to devote enough attention to the analysis of labor. Even though labor is the most important resource of our economy, we know much less about it than we do the other resources. We have always shown more interest in the commodity markets than we have the factor or resource markets. Furthermore, when attention has been focused upon labor, romanticism has all too frequently hindered effective analysis. If labor conditions are unsatisfactory, a scapegoat must be found—the employer because he is greedy and anti-social and exploits his workers, the State because it does not have adequate social and labor laws, the community because it permits or abets prejudice and discrimination. Seldom is there an attempt to discover the fundamentals that have resulted in a situation considered undesirable.

One of the major consequences of our romantic approach to labor has been the acceptance among almost all "right-thinking" people that labor is not a commodity and that it is sinful to so consider it. In part, as a consequence, inadequate attention has been given to the functioning of the labor market and the procedures that might well be taken to make that market operate more smoothly and effectively.

There is a striking contrast between the market for wheat, for example, and for labor. The Montana wheat farmer can find out each day—or several times each day—the price of wheat in Chicago, Kansas City or Minneapolis and probably Winnipeg by listening to his radio. He can find out what it is locally by telephone to the local elevator and in recent years, the P.M.A. office. If he wishes to ship to Minneapolis he can sell the wheat before it leaves his farm by a futures contract. But if the same farmer wants to sell his own labor or to purchase labor, he does not find a market of the same nature as that for wheat, with its world-wide news service and other systematic functions. In fact, about all he could find would be rumor—that carpenters in Billings are paid the fabulous wage of $3.00 an hour or that in the next county someone hired a good farm hand for $150 a month. He would have little or no chance of finding out what farm wages were in Colorado or whether it would be advantageous for him to "import" a farm worker from there.

I

In this paper I shall try to indicate how a labor market might be organized that would operate reasonably effectively and would aid in bringing about desirable shifts of manpower. I shall define a desirable shift of manpower as occurring if two requirements are met. Such a shift must result in an increase in the marginal productivity and real earnings of the person making the shift. In another and somewhat more complicated phraseology, a desirable shift of manpower is one that results in an increase of the net national product. Furthermore, a desirable shift is one that is consistent with the freedom of the individual to choose as he sees fit. The freedom of the individual to choose his job is one of the most precious advantages of our political and economic system. It should be restricted only when there is a strong and positive case for doing so. But freedom of choice, in my mind, implies in some sense the pre-existence of the opportunity of choice. Most of the policy suggestions that I shall make later are no more than an attempt to specify how freedom of choice of job and occupation can be made meaningful by broadening the range of available alternatives.

II

Before turning to our positive proposals, we may consider for a moment the limitations of the labor market as it now functions with respect to the allocation of farm labor, both within agriculture and between agriculture and the rest of the economy. My use of the term "farm labor" shall be inclusive of all labor used on farms, including the operator, unpaid members of his family, and hired workers. The criterion for evaluation will be the degree to which the labor market achieves equal real returns for comparable labor. This is essentially a short run criterion and accepts as given differences in capacities of workers—differences that might have been reduced by more nearly equal access to opportunities for investment in the human agent through more adequate education and health facilities.

I must now make several assertions that delineate the nature of the desirable shifts in agricultural manpower. Time does not permit providing the evidence underlying these assertions, but I hope that they can be accepted as a basis for formulating a program.

There is not an important malallocation in the use of farm labor outside of the South Atlantic, East South Central and the eastern half of the West South Central States. In the rest of the country, except for a few relatively limited areas in terms of farm population, the operator and the members of his family have received for their labor since the end of the war a real return equal to or greater than that received by the average nonfarm worker. It is not unlikely that by mid-1951, except in the South,

the hired farm worker who depends upon farm wage work for his main source of income has also achieved a real labor return roughly equal to what he might earn elsewhere.

In the remaining area of agriculture, which includes almost 45 percent of the farm work force, a seriously low level of labor productivity and income persists. There are from 1.5 to 2.0 million farm workers who are not now receiving for their labor efforts in excess of $750 per year. This is no more than a third of the average labor returns on farms in the rest of the Nation. It is not true that most of these workers are nonwhites, though the nonwhites are over-represented compared to their significance in the total farm population.

I have argued elsewhere that the continued existence of the low level of labor returns in southern agriculture cannot be explained on the basis of two frequently held beliefs.[1] One of the beliefs is that labor unions have so influenced nonfarm wage rates that employment alternatives have been reduced as a consequence. The majority of nonfarm jobs are in industries or occupations that are not unionized; furthermore, there is no evidence to indicate that unions have been successful in improving their wage rates relative to the non-unionized areas. The other belief is that the South is an area of low incomes in general, and that the job opportunities available are relatively low paying ones. This is true for nonwhites living in nonfarm communities, but it is not true for whites. Since it is not true for whites, it is not an explanation for the existence of such low farm labor incomes for so many whites.

III

It is impossible to achieve the best use of farm labor without at the same time achieving more adequate use of other farm resources. This is particularly true where farm acreages are too small and the existing technology is inconsistent with the highest possible returns for labor and capital. The movement of a large number of farm workers out of the Appalachian area and other parts of the South would not appreciably improve the productivity of those remaining, unless a more advanced technology, with its required capital, were introduced. Though there is a great deal of underemployment in these areas, there is generally some time of the year when all available workers are fully employed. The removal of workers under these circumstances would reduce output and total farm income for a given farm or area.[2] If it is not to do so, a different technology must be available that will make it possible for

[1] "Functioning of the Labor Market," *this Journal*, XXXIII (1951) pp. 75-87.

[2] For evidence confirming this view, see the excellent study by Francis E. McVay, *Factory Meets Farm in North Carolina*, North Carolina State College, Tech. Bul. No. 83, 1947, pp. 13-17, esp. Table 13. McVay found that as off-farm work increased in importance, the acreages of cotton and tobacco declined rapidly.

those still remaining on the farm to produce roughly the same output. If a new technology is not adopted, the intensive crops now being grown will have to be reduced and replaced by more extensive ones or ones with different peak labor requirements. I suspect that this is a world-wide phenomenon. Except where governments have interfered, such as in production or acreage restriction programs, there is some critical time of the year when all of the available labor is fully utilized. Removal of some of the labor, without introducing a different technology and/or more capital, would reduce farm output.

This argument, if valid, implies that it will require something more than a reduction of the farm labor force in the areas of low labor productivity in agriculture if the incomes of those who remain in agriculture are to be improved. A recent study by Professor Dickins bears this out. In two Mississippi counties where industrial employment was important, she found that the farm families who retained agriculture as their main source of income now had net incomes only a little more than half as large as those families, still residing on farms, who relied upon their farms for only part or none of their incomes.[3] The families who continued to depend upon farming for their income had not increased the size of their farms and apparently had not expanded the use of other forms of capital in recent years. McVay, in his study of North Carolina farms, also found that the availability of off-farm work in the area had not permitted the reallocation of resources that would have made possible higher incomes for those families who did not directly avail themselves of the off-farm work opportunities.[4]

IV

Earlier we contrasted the markets for wheat and for labor. But this analogy cannot be stretched too far. Labor has certain characteristics peculiar to it and many of the conditions and presumptions of the wheat market simply do not apply. We may turn now to a consideration of the possible reasons why the labor market has tended to perform so badly in certain respects. In this discussion we shall rule out mass unemployment. Mass unemployment was responsible for a great deal of the malfunctioning of the labor market during the thirties, but we have now had more than a decade of essentially full employment, and the problems we are concerned with still persist. And I am confident that

[3] Dorothy Dickins, *The Rural Family and Its Source of Income*, Mississippi State College, Bul. 481, 1951. In one county, only 15 percent and in the other, 37 percent of the families still relied mainly upon farming for their incomes.

[4] McVay, *ibid.*, p. 22. The farm families who did no off-farm work had only slightly more cropland than did the families who used a larger proportion of their work time for off-farm work than for farm work.

mass unemployment on the scale of the thirties is not likely to be the fate of the fifties.

Let us turn now to those characteristics of labor and the labor market that may indicate how the labor market may be made to function more appropriately.

A. *Limitations on the Freedom of Contract.* One of the consistent trends in Anglo-Saxon law has been continually to restrict the right of the individual to contract away his freedom. An individual is not allowed to contract away his control over his own mind and body, except in certain limited circumstances related to artistic talents, such as those controlled by movie stars or professional baseball players. Even here the performance of service cannot be forced, and occasionally damages for failure to perform will be enforced. But generally the most that can be done is to prevent the sale of similar services to anyone else during the period of the contract. This restriction on contract places the individual who owns nothing but labor power at a serious disadvantage in arranging for the sale of his services. Since he cannot pledge his services for a definite period of time, an employee is subject to considerable uncertainty if selling his services requires an initial investment which can be recouped only over time. If the individual owns only labor power, he is under considerable compulsion to find a practically continuous opportunity to market his services.[5] Agriculture generally provides this, even for the hired worker because of the wage flexibility in the market. Urban employment frequently does not, even during periods of nearly full employment, because of the dynamic nature of the society. Of course, I do not want to imply that individuals should be permitted to pledge themselves into involuntary servitude, but only to point out the problems resulting from this particular institutional restriction.

B. *The Relevance of the Conditions of Use of the Service.* The man who sells his wheat or corn is little concerned about the use to which it is put. Whether he is a pacifist or a member of the W.C.T.U., he seldom inquires whether the wheat will be made into alcohol for use in explosives or to create a drunken stupor. But the performance of a labor service and the physical presence of the individual performing the service cannot be separated. This not only requires the movement of the worker to the point at which the service is to be performed, but it also requires his willingness to accept the specific conditions under which the service is performed. Lack of familiarity with the implications of factory work to personal happiness and satisfaction undoubtedly limits willingness of farm people to change occupations.

C. *Knowledge of Alternative Opportunities.* The labor market, as it is

[5] In this section I have drawn heavily upon Frank H. Knight's *Freedom and Reform,* (New York: Harper & Brothers, 1947) pp. 64-5.

now organized, makes it extremely difficult for any individual to obtain pertinent information about available opportunities. In most cases, it can be done only by personal investigation, which may explain why most migrants move relatively short distances, generally 50 miles or less. One of the reasons why knowledge cannot be more easily obtained is the near impossibility of achieving standardization of labor services. The farmer will know approximately what grade his wheat is because it has been possible to achieve sufficient acceptance of relatively objective standards. But the relevant qualities and characteristics of labor are not readily observable and measurable, nor can the inexperienced interpret the requirements of a specific job in a manner meaningful to him—meaningful in the sense of determining whether he can effectively perform the necessary operations. Thus the type of data that one finds in the want ads is not likely to go nearly far enough in permitting an individual to determine to what type of job he might expect to get in the nonfarm environment.

D. *Costs of Movement.* There are both objective and subjective costs of movement from where one is to where job opportunities are available. For the young, unmarried male, the most important costs are probably subjective, though the significance of the objective costs, since they are so uncertain, should not be underrated. For such an individual the most important money cost is his own maintenance while he finds work and awaits his first pay check. But the uncertainty of the new life where job opportunities require a change of location must inhibit many from making a change. I suspect that many do not move because they rate fairly high the possibility of failure, and are unwilling to accept the social and personal implications of the required return to the home community. For the worker with a family, the objective costs are probably significant—both in terms of transport and maintenance. How much of the much lower mobility of families as contrasted to individuals is due to this fact, we do not know, but it is reasonable to believe that it is important.

V

If the above factors are the important ones in the labor market that prevent the equalization of real returns to comparable labor, what types of policies and programs are required? We cannot be confident that any of us has the answers. There is relatively little in the way of experience to guide us in the United States, Canada, or any other nation. No modern Western nation has been able to avoid its islands or subcontinents of the agricultural poor. We are not even sure why such areas arise and the reasons noted above may not entirely explain why they persist.[6] No

[6] For a further discussion of this point, see T. W. Schultz, "Reflections on Poverty in Agriculture," *Journal of Political Economy*, LVIII, February 1950, pp. 1-15.

attempt will be made to delineate a detailed program, but the broad outlines of one are sketched.

The first step that should be taken in any attempt to facilitate shifts in manpower is an expansion of the available sources of information. The United States Government spends far more resources upon information about commodity markets than it does upon labor markets. If anything, the reverse should be true. But it is no simple task to provide adequate coverage of pertinent information on labor markets. Because of the lack of standardization of labor services, the multiplicity of job classifications, and the nature of wage-setting processes, it is hard to imagine that a market news report such as is generally available for livestock, grains, and cotton would be very helpful.

The type of service that seems required involves personal contact between the prospective job seeker and someone with expert knowledge of the labor market. It implies, I believe, the establishment of several thousand labor offices or exchanges throughout the country. One of the functions of such offices would be to maintain as complete a file as possible of job conditions in nearby areas and to obtain information about jobs in more distant areas when needed.

But such an organization should not stop at supplying information about job opportunities. It must be in a position to do at least three further tasks. First, it should help the individual determine the types of jobs for which he is best suited in terms of training, innate skills, and temperament. I suspect that there is a great deal of error in all vocational or job counselling as that field now exists. Even so, if farm management experts can help farm operators in their decisions, it seems likely that such a service would help individuals in avoiding many mistakes.

A second endeavor of such an agency should be to actually obtain jobs for individuals prior to movement. Under employment conditions such as now exist, employers would undoubtedly be willing to enter into such contracts for a period of reasonable duration, such as six months, if no direct costs were imposed upon the employer. This brings us to the third additional function of such an agency, namely, to finance the transition from low productivity farm work to higher paying jobs elsewhere. The financing could be on either a loan or grant basis to cover cost of movement and maintenance and, if necessary, to cover the cost of returning if adjudged necessary or desirable. In the long run, the grant basis might be the cheaper because of the cost of administering the relatively small loans involved. As a nation we have been willing to make loans or grants for many purposes that did not have the possibilities for a similar chance of enhancing the national product.

Any agency charged with these various functions would have to be a federal agency if local political considerations were not to distort its

purposes and functions. It also should not be considered a farm labor program, since one of its major purposes would be to aid in the transfer of labor between agriculture and the rest of the economy. Our experience with the farm labor program in World War II illustrates the problems involved on both scores. When wage rates are stable or rising, there is never a "labor surplus" in a given area. Consequently, if local or state officials must make the decision relative to labor movements out of the area, the decision will almost always be a negative one, regardless of how low the wage rate may be. In the years ahead, local groups will resist attempts to reduce the quantity of labor available to agriculture even though labor returns are lower than elsewhere. It is difficult for a farmer in a given area to recognize the importance to his own income of relatively high returns to hired labor. It is never sufficiently apparent to an employer in a competitive industry of small scale firms that the main resource he has to sell is his own labor and that a general increase in returns to labor will be to his own benefit.

There are obvious disadvantages to a federal agency. It would be difficult to concentrate the efforts in the areas of the greatest need. However, the advantages of improved labor information seem so apparent that the usual procedure of federal agencies of spreading all over would not seem to result in too much waste.

I have said nothing about a general improvement in education in rural areas and in the South in particular. During the last decade, there is evidence on all sides that there has been a considerable improvement in rural educational services. But there is still too small an expenditure upon Negro education in the segregated schools of the South, and the poorer rural areas of the South undoubtedly cannot afford education opportunities for their children equivalent to those prevailing elsewhere. The benefits from a longer period of higher quality education would not be immediately realized, but the investment period is not so long that major benefits would not be apparent within a decade. One of the major contributions of education, by broadening horizons, is to increase mobility.

There is no question that the location of new employment opportunities near the centers of underemployed farm workers would reduce the problems of achieving the desired shifts in manpower. But several of the areas with large numbers of underemployed do not seem to have the requisite advantages for attracting nonfarm employment—rapid and cheap transportation, access to raw materials, or proximity to markets. Though it may be possible to attract firms that produce products that are neither market nor raw material oriented (such as plastics, some light metal fabrication), these possibilities do not seem to loom large. Consequently, I believe that major emphasis will have to be in terms of shifting manpower to the existing labor centers.

DISCUSSION

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I would like, first of all, to say that we welcome Dr. Johnson's entry into the group of farm labour economists. Some of us have thought for some time that labour is not only the most neglected, but also one of the most important parts of agricultural economics. Naturally we are glad to see the truth of this statement being recognized by others.

There is another reason I am glad to see Dr. Johnson taking an interest in farm labour. As one who has spent some time in the field of theory, he brings to the analysis of farm labour problems an important contribution. I am sure we all agree that the results of analysis in this field are likely to be more fruitful when it is based on an integration of theoretical discussion on the one side and empirical research or operational experience on the other.

In general, Dr. Johnson's paper exhibits a certain freshness of approach which one is always glad to see. While he might have gone further in discussing some of the problems one confronts in labour market analysis, he has raised a number of worth-while questions for consideration.

One of the two criteria of desirable shifts of manpower which Dr. Johnson mentions is that the shift should result in an increase in marginal productivity and real earnings of the person making the change. There would be occasions, I would think, particularly in the case of employed farm workers and share-croppers, when real earnings are less than the marginal product. When this is the case the suggested test might give a wrong lead, especially when earnings are used without reference to the marginal product. Equality between real earnings and marginal product usually depends on complete freedom of mobility of labour. Alternatively, the fact that real earnings are lower than marginal product arises, in some cases at least, from the absence of freedom of mobility. Under these circumstances it would seem more appropriate to use margional product rather than earnings as the criterion, but this relationship between real earnings and marginal product in agriculture needs further examination.

In the early part of the paper Dr. Johnson refers to labour market analysis as inhibited by a "romantic approach to labour." I agree that there has been a certain romanticism with regard to discussions of farm labour, but it seems to me this romanticism has been tied up more with the widespread attitude toward agriculture as a way of life rather than with the factors he mentions. Attachment to the land, the community, or the livestock are often more dominant motivations than respect for one's health, recreation, or even economic security. I do not mean to suggest that this romanticism should be removed, but rather that a balance is needed between agriculture as "a way of life" and as "a way of making a living." It is not so much a question of conflict here as it is a question of recognizing that one supplements the other, and that in the past, attention has centered on philosophic considerations often at the expense of the economic.

Dr. Johnson implies that labour should be treated as a commodity for purposes of analysis. The problem he seems to suggest is basically to develop a method of shifting uneducated and untrained southern farmers from their environment on small share-cropping farms to urban industries in other regions of the country.

Rather than thinking of labour as a commodity, is it not more helpful to think of labour as a service which is essentially non-homogeneous, taking many different forms, depending on skill, training, age, sex, and cultural background, including attitudes towards work, income, family, and community? This lack of homogeneity increases greatly the problems involved in transferring labour.

There seems to be an assumption throughout the paper that if these southern people are properly informed of higher paying jobs elsewhere, and it is made financially possible for them to move, they will move. This is an oversimplified solution to the problem. Our experience in Canada, where we have taken steps along both of the lines suggested, through our Federal-Provincial Farm Labour Program operating through the National Employment Service and the Provincial Departments of Agriculture, indicates that mobility of labour is a highly complex question. This is also borne out by the studies made by Lloyd Reynolds and others in the New Haven area of Connecticut.[1]

Dr. Johnson, it is true, does recognize the subjective as well as the objective costs of mobility, but I would be inclined to attach more emphasis than he does to the noneconomic factors, such as attachment to homes and families, traditional ways of doing things, uncertainty or fear of the unknown or the unfamiliar, and the question of one's cultural background, including language. It is true that the question of language may be more important in Canada than in the United States but, without wishing to cast any reflections on those of you from the other side of the Mason and Dixon line, some of us northerners would say that there is a language problem in the South. The southerners would, no doubt, say that the reverse is also true.

One specific example of what I have in mind might be useful. When we started an organized movement of farm workers from the Prairie Provinces to Ontario in 1943 to assist with haying, we found that a substantial number of those who participated in the movement did so in order to visit relatives down East, or the communities they had left when they were young. In this case and and in most of our other organized movements, information is provided regarding the jobs, the going wages are stated and generous transportation assistance is provided, but the desire to visit relatives in the East has been at times an overriding consideration. This, it is true, is a seasonal movement, but it illustrates one of the noneconomic factors sometimes involved in labour mobility.

In discussing a possible program for moving surplus farm workers, Dr. Johnson emphasizes the need for analyzing the use of labour along with the use of other farm resources. It seems to me that this is important in the surplus labour areas as well as in the deficit areas, because I am inclined to think that one of the most effective ways to achieve the needed labour mobility is to tackle the question of reorganization of agriculture in the surplus areas themselves.

We need to know more about the reasons people do not move, as well as the reasons why people do move. There seems to be a level of income below which workers seem to hold on to their farms for dear life. Through reorganizing agriculture or finding other ways to raise the standard of living above this level, there might be a chance for greater mobility of farm labour to other rural or urban areas than would otherwise be the case.

There is a stretch of country between here and Ottawa, known as the Haliburton District, in which there are a number of isolated subsistence farms. We found it difficult to get workers out of this area during the war years, even

[1] Lloyd G. Reynolds, *The Structure of Labor Markets*, Harper & Bros., New York, 1951, pp. 43-112.

though we went into the district and interviewed individuals, telling them of employment opportunities and of financial inducements elsewhere. About the only way, at that time, to get any of these people to move was to say to the young men "either you move to some productive farm or you will have to go into the Services."

It seems to me what is most needed in an approach to this problem of mobility of labour, is to examine carefully the particular situation in each area concerned. What I have in mind here is the type of action taken, for example, in the Prairie Provinces under the Prairie Farm Rehabilitation Administration. Some areas unsuitable for dry farming through prolonged cropping and drought conditions have been declared special grazing areas, and families have been moved thence to agricultural districts farther north. By attacking the problem in a direct manner such as this, it is more likely that solutions will be worked out appropriate to the areas than if planning is made on too broad a basis.

I do not want to deprecate the importance of the suggestions that Dr. Johnson has made, but rather to stress the need for a mental analysis related to the areas and the people concerned.

DISCUSSION

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In his paper Mr. Barton very properly calls attention to the important role played by agriculture in producing essential raw materials and supplies and in maintaining a working population adequate for our needs in peace as well as in war. Some additional consideration should perhaps be given to needs in a "twilight zone" between peace and war such as we may have to live with during the next 10 years.

Mr. Barton points out that "several million" workers have gone from farms to nonfarm employment during the last decade, but adds that "volume of farm output" is now at a record level. The essential question before us is "How many workers will agriculture require during the next 10 years?" This question cannot, of course, be answered apart from the question of "*What* will be required of agriculture during the next 10 years?" Mr. Barton and his associates in the BAE have made several long range projections which point to a total agricultural output within the next decade at a rate 60 percent above the 1935-39 level. It is to be noted, however, that we expect to achieve this year a level of output nearly 50 percent above prewar. Barring unforeseen circumstances and even allowing for a considerable degree of emergency, the goal of 60 percent increase does not appear to be unreasonable. The question then is not "can we make it?" but "what will it take?"

It has been said that a mathematician if asked how much is 2 + 2 will answer "Four." An orator, on the other hand, would likely reply: "When in the course of human events it becomes necessary to add to the second numeral in the arabic series an amount equal to itself, the sum, I can state without fear of successful contradiction, will invariably be four." Mr. Barton, in his paper, gives evidence of possessing the qualities of both a mathematician and an orator. He proves to be somewhat of an orator in discussing trends in farm output, in labor productivity and inputs, but his mathematical instincts lead

him to conclude that "average annual employment on farms may drop to 9.3 millions by 1960, a reduction of 10 percent, or one million, from 1950." He goes on to say: "Reports for the first six months of 1951 show farm employment about four percent under the corresponding period for 1950," but he feels that this figure will not hold for the year and says that even "the projection of a decline of one million" over the next decade "assumes the maintenance of a high level economy and full employment."

This, however, is *not* the question at issue. Manpower *requirements* in agriculture will certainly not immediately be *less* under full employment and a high level economy than they would be under a reverse situation. What, in effect, Mr. Barton seems to be saying is that, if nonfarm jobs are *not* available, more workers will be *required* in agriculture. That there will *be* more workers in agriculture under these conditions is not to be doubted, but that more will be *needed* is seriously to be questioned and I am certain that this is not what he *meant* to say. The confusion seems to lie in a misinterpretation of assignment. For the moment, I do not believe we are concerned with the number of farm workers who *will* be absorbed into nonfarm jobs as Mr. Barton's paper seems to imply, but rather with the number who *could* be absorbed without affecting the ability of agriculture to measure up to its productive responsibilities. To be more specific, we are concerned with the problem of approximating the number required to meet agriculture's productive requirements regardless of the "pull" away from or to the farm. In spite of a very excellent analysis of the productivity of labor, Mr. Barton seems not to have come to grips with this particular problem.

On all sides, as pointed out by Mr. Barton, there is abundant evidence that agriculture not only can produce the required amounts of food, fiber, and other raw materials, but that the job could be done better with less labor—and by "less" I mean less than would be left in farming after the one million decline envisaged by Mr. Barton had already taken place. For example, it has been estimated that the development of more efficient agriculture in the 16 subregions of the South would be accompanied by a reduction of about one third in the farm population *"that is directly dependent upon farming for the major source of income in these areas."*[1] The total number of workers involved in a reduction of this magnitude is well over a million; and this does not take account of workers on approximately one million additional small scale farms (most of them in the South) which contribute almost nothing to total agricultural production.

The South, it must be observed, still has more than half of the "so-called" agricultural workers in the United States, but only about one third of the nation's agricultural land and about one fourth of the nation's agricultural capital. This means that the average southern farm "worker" exercises his productive abilities over somewhat less than 20 acres of cropland as compared to more than 50 acres for the average farm worker in the rest of the country, who incidentally has taken on a greater number and variety of other enterprises. It would be a rash person indeed who would claim that the South would not be better off at the end of the 1950's if at least one million of the less-than-average among them could have found jobs in industry. Certainly the productive power of agriculture would in no wise be impaired by such a change. On the

[1] *Agricultural Adjustments Toward an Efficient Agriculture in the South*, Reprint from *Hearings on Study of Agricultural and Economic Problems of the Cotton Belt*, Washington, 1947.

contrary, there is every reason to believe that three million farm workers in the South would produce substantially more than is now produced by the more than four million we now have.

I do not find in Mr. Barton's paper any suggestion that there will be a need for any *increase* in the number of farm workers *outside* the South, in which case his estimate of 9.3 million "probably required" *could* be reduced to 8.3 million on the basis of southern requirements alone. This would still be 300,000 more than the number estimated as required (by 1960) in a study made for the Twentieth Century Fund which contemplated "a real expansion" in our agricultural output by that date.[2] It compares with an average monthly agricultural employment figure which, according to the "Survey of Current Business," reached nine million only once between April 1950 and April 1951.[3]

Altogether, then, it appears to this commentator that Mr. Barton's figure of 9.3 million is a more accurate estimate of the number of workers *expected* in agriculture than it is of the number which will be *required* by 1960. For my part I am inclined to go along with a statement by Dean Myers of Cornell who said recently:[4] "Although American agriculture is the most efficient in the world, it can be made better in the years ahead. Given fair prices, an abundance of food for our increasing population can be produced by not more than three million efficient family-sized commercial farms, about one half of our present five and a third million counted by the Census. Progress in this direction will be promoted by decentralization of industry and by better education to provide training, not only in agriculture for young men who will farm, but also for nonfarm vocations and professions for the one half of the number of farm boys not needed in modern mechanized agriculture."

[2] *USA Measure of a Nation,* The 20th Century Fund, Published by the Macmillan Company, New York, 1949.

[3] *Survey of Current Business,* U. S. Dept. of Commerce, June 1951

[4] W. I. Myers, "The Agricultural Experiment Station in the Service of the State and Nation," speech at New Brunswick, N.J., June 12, 1951, mimeographed, pp. 13.

LAND POLICY

Chairman: E. H. Wiecking, Bureau of Agricultural Economics

ALBERTA'S PUBLIC LAND POLICY, PAST AND PRESENT

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ALBERTA, the fourth largest province of Canada, is slightly larger than the State of Montana and covers an area of over 163 million acres, of which only 41 million acres or about 26 percent is now occupied as farm land. Of the remaining 74 percent, which includes lands in cities and towns, lands covered by water, and lands in parks and forest reserves, about 20 million acres are still considered potentially arable lands. These 20 million acres are about equal to the estimated potentially arable land in the rest of Canada.

Approximately 90 million acres, or over 55 percent of the area of the province, are still public land which comes under the administration of the Department of Lands and Forests of the Alberta Provincial Government. Of the 90 million acres coming under the administration of the Department of Lands and Forests, only about nine million acres are now occupied under lease or sale agreement.[1]

In a democratic country such as Canada new governmental policies tend to evolve out of past policies. This is true in relation to the administration of public lands, consequently an intelligent discussion of Alberta's present public land policy must of necessity include a discussion of the land policies of the past.

For convenience of discussion, land policies of the past and present are divided into the following periods:

1. Period 1670 to 1870—Hudson's Bay Company administration.
2. Period 1870-1930—Dominion Government administration.
3. Period 1930 to the present time—Provincial Government administration.

Hudson's Bay Company Administration

During the administration of the Hudson's Bay Company and part of the Dominion Government the territory which is now Alberta was not administered as a separate unit but as part of a much larger area which included most of western Canada, with the exception of British Columbia.

[1] The estimate of 20 million acres of potentially arable land was given by A. Leahy, Principal Pedologist, Dominion Department of Agriculture. The other figures were taken from Canada Year Book, 1950, Census Reports, and figures compiled from Annual Reports of Department of Lands and Forests.

Strange as it may seem, western Canada, including Alberta, was under the administration of the Hudson's Bay Company from 1670 to 1870, a period of 200 years, while the Dominion and Provincial administrations cover a period of just over 80 years.

On May 2, 1670, King Charles II granted the Governor and Company of Adventurers of England (Hudson's Bay Company) not only the right to trade, but absolute territorial rights to colonize and govern the area of Rupert's Land, which included what is now the Provinces of Manitoba, Saskatchewan, Alberta, the Northwest Territories, Yukon Territory and part of the Provinces of British Columbia and Ontario.

That the company was successful in establishing fur trade is a well known fact, and has little if any bearing on a discussion of land policy. Since the main purpose of the Hudson's Bay Company was fur trading rather than colonization, the latter could only be fostered to the detriment of the former. It is easy to understand, therefore, that the company not only discouraged colonization and land settlement, but in many cases took active measures to prevent it. The only exception was in 1812, when Lord Selkirk, a shareholder in the Hudson's Bay Company, was given a grant of land in the vicinity of the present city of Winnipeg, for the settling of 1,000 families during a period of 10 years. The colony had many difficulties, of which transportation to a market was one of the greatest, and by 1870, when the Hudson's Bay Company surrendered Rupert's Land to the newly formed Dominion of Canada, there were fewer than 1,000 white people in the settlement.

Dominion Government Administration

At the time of the transfer of Rupert's Land, the Dominion Government found itself in control of a vast uninhabited territory which included what is now the Provinces of Alberta, Saskatchewan, and Manitoba. This territory was bounded on the west by the Province of British Columbia, which was undecided whether or not to join the Dominion of Canada, and agreed only after being guaranteed a transcontinental railway link with eastern Canada. On the south this territory was bounded by the United States which, according to the words of Sir John A. MacDonald, Prime Minister of Canada at that time, "are prepared to do all they can short of war to get possession of the Western Territory and we must take immediate and vigorous steps to counteract them."[2]

Furthermore, the Dominion Government in 1870 was faced with the problem of carrying out the terms of surrender made with the Hudson's Bay Company, which included granting 1/20 of the land located in the fertile belt of western Canada to the Hudson's Bay Company.

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[2] Joseph Pope, *Correspondence of Sir John A. MacDonald.*

For the foregoing reasons the Dominion Government, in establishing the Province of Manitoba in 1870, and the Provinces of Alberta and Saskatchewan in 1905, did not adhere to the practice followed in the other provinces of granting the natural resources for provincial control. As stated in the Manitoba Act of 1870, the natural resources were retained for the "purposes of the Dominion." The purposes in 1870 were threefold:

1. To promote rapid settlement in this large territory in order to consolidate the new Dominion of Canada and discourage the territorial ambitions of the United States.
2. To encourage the building of railways, through land grants.
3. To carry out the terms of the agreement with the Hudson's Bay Company.

By 1900 the threat of an invasion from the United States had passed, but by this time the Dominion had still another purpose for promoting rapid settlement of the Western Territory. This purpose was expressed in the House of Commons by the Honourable Clifford Sifton, Minister of the Interior, in 1903, when he stated in part as follows, "I want the House to understand the policy which this Government is following. It is endeavoring to build up a consuming and producing population in our vast Western Territory for the purpose of giving legitimate occupation, without excessive duties, on a legitimate business basis to the mechanics and artisans in Eastern Canada."[3]

Thus the purposes of the Dominion in retaining the natural resources were both political and economic. However, the economic purpose was not to settle the land according to its best use but to create a consuming public and supply a market for the eastern manufacturer.

Prior to the transfer of the Western Territory to Dominion control several surveys were made by qualified men of that day to determine the suitability of the area for settlement. Some of the reports submitted were contradictory, but the general consensus of opinion was expressed by Captain John Palliser, who stated that the area forming a triangle in southeastern Alberta and southwestern Saskatchewan was unsuited for agricultural settlement.[4]

The Dominion Government, however, in opening up the land for settlement, ignored this and other similar warnings with respect to land use.

Soon after 1870 the Dominion Government adopted the grid system of survey used in the western United States, by which the land was surveyed into townships six miles square, containing 36 sections of 640 acres per section and each section divided into four quarters of 160 acres each.

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[3] A *Case for Alberta*, a report prepared in connection with the Dominion Provincial conference, 1936, p. 53.

[4] Ibid., page 46.

The Dominion Government disposed of the lands in each township as follows:

Sections 11 and 29, or approximately 1,280 acres out of each township, were reserved for a school endowment trust fund and were administered for revenue purposes. These lands were sold by the Dominion Government at public auction sales held whenever the conditions were considered favorable for obtaining a good price. This was usually after the surrounding lands were settled.

In Alberta, Section 8 and 26 in every fifth township, and Section 8¼ of Section 26 of all other townships in the area south of the North Saskatchewan River were granted to the Hudson's Bay Company, who adopted a similar policy in the sale of lands, as in the case of school lands, that is, withholding the lands from sale until the conditions were considered favorable.

The odd-numbered sections, other than school lands, were reserved for grants to railway companies. Over 13 million acres were granted in Alberta for this purpose. These lands were sold by the various railway companies. However, generally the railway companies, especially the Canadian Pacific Railway, granted easier terms than the school lands or Hudson's Bay Company land administration, as they wished to encourage settlement because they benefited not only from the proceeds of the sale of the land, but also from the increased volume of railroad traffic.

The balance of the even-numbered sections in each township were made available for homesteading. After 1908, by which time most of the land granted to railways had been selected by the companies, all available lands were thrown open for homesteads. Homesteading, the method of settling lands in western United States, was adopted as the basis of land settlement for western Canada. Homesteading regulations provided that a male person 18 years of age or over, who was or declared his intention to become a British subject, upon payment of a fee of $10.00 could obtain a homestead entry for 160 acres on any available land in the Prairie Provinces. After completing residence duties for six months in each year for three years, and breaking and cultivating a specified area of land (usually about 15 to 25 acres per quarter section), the homestead entrant could apply for, and obtain, title. Other than a few minor changes in duties required, there were no fundamental changes in the homestead policy from the time it was inaugurated in 1870 until the time of the transfer of the resources to provincial control in 1930, except for the policy of granting preemptions. Under the policy of preemptions adopted in 1874, any person holding a homestead entry on 160 acres or having acquired title could apply for another 160 acres of land in the vicinity of the original homestead, and acquire title by performing further residence and cultivation duties on the homestead land or on the preemption

land, and by paying a nominal purchase price, usually $3.00 per acre.

By 1930, the Dominion Government had accomplished its purposes, and the natural resources still remaining in the name of the Crown in Saskatchewan, Alberta, and Manitoba were turned over to the provinces for administration.

The purposes accomplished by 1930 were as follows: Canada had consolidated her position as a nation. The readily available lands in the Provinces of Alberta, Saskatchewan, and Manitoba had been settled, the railroads had been built with the help of land grants, and the Hudson's Bay Company had received its grant of land. There were real accomplishments and it is claimed by some, and perhaps justly so, that the beneficial effects of the Dominion Government's land policy more than offset the adverse effects. This may be a question for the historian to decide; it need not concern us here.

The main adverse effects of the Dominion Government land policy may be enumerated as follows:

Allowing settlement under the homestead policy on any available land, regardless of location, tended to scatter settlement, with the result that it was difficult to furnish the necessary social services. Taxes were charged from the date of the homestead entry, and many homesteaders found that by the time they obtained title, taxes had accrued beyond their ability to pay and the municipal authorities were forced to foreclose.

The homestead policy was based on the premise that every 160 acres, or with a preemption, every 320 acres of land in western Canada were an economic farm unit capable of supporting a farm family. Unfortunately, this was often not true, due to the nature of the soil and climatic conditions in the areas settled, and due to the economic conditions and state-of-the-arts, as pertaining to agriculture, in existence of that time. This is evident by the fact that between 1905 and 1930 nearly 40 percent of the people obtaining homestead entries failed to obtain title.

The assumption that each 160 or 320 acres were an economic farm unit also meant that all of the social services such as roads, schools, and even towns and villages were developed on the basis of one family per 160 or 320 acres. Taxation was on the expected productivity, with the inevitable result that many settlers lost their land by tax recovery proceedings and foreclosures by mortgage companies due to unpaid debts. Finally, in some areas a readjustment had to be made of the whole structure of land valuation, taxation, social services, and land use. This readjustment in land use was one of the fundamental problems facing the provinces when the natural resources were transferred in 1930. In addition, Alberta still had available agricultural lands and the problem of developing an adequate land settlement policy had to be solved.

Dominion Government Grazing Policy

With the opening up of the Western Territory for settlement in 1870, many cattlemen became interested in the grazing possibilities of this area. To meet the demand for grazing rights the Dominion Government established grazing lease regulations in 1881 which provided for the granting of grazing leases up to 100,000 acres for a term of 21 years. At first the leases were granted without inspection of the lands and a lessee was required to stock the land at the rate of one head per 10 acres. This was later reduced to one head per 30 acres. A flat rate of rental was charged that varied occasionally with periods of prosperity and depression. Taxes were charged separately by the taxation authorities. During most of the Dominion Government's administration, grazing leases were considered as subordinate to the main purpose of land settlement; the lessee had little security of tenure, as the lands held under lease could be made available for homestead purposes at any time during the term of the lease.

The Dominion Government had various other forms of regulations for the disposition of land for specific purposes, but these did not affect the over-all policy of land settlement. Only a relatively few parcels of land were sold by the Dominion Government, as this did not fit in with the policy of encouraging land settlement.

Provincial Administration of Crown Lands

For the first few years after the transfer of the natural resources from the Dominion to Provincial Government control, the Province continued to administer the lands under regulations similar to those of the Dominion Government. The homestead policy was continued with certain limitations to the granting of homesteads in the southern part of the province. Also, the Province followed a similar grazing policy to that of the Dominion Government. However, toward the end of the depression years, that is, the late 1930's, the defects of the homestead policy began to pyramid. Much of the better land was already settled and it was more and more difficult to find a suitable quarter section of land. Many homesteaders were on relief, and the Province was responsible for their welfare. In the southeastern portion, thousands of acres of titled homestead lands reverted to the municipalities for nonpayment of taxes. In many cases, grazing rentals and taxes which were levied on a flat rental basis were badly in arrears. It was evident that the Government needed a new land policy, especially with respect to land settlement, grazing leases and readjustment of the settlement in the areas, such as in southeastern Alberta, where by experience the land was found to be unsuitable for continued cultivation under the conditions existing at that time.

The new land policy did not come into effect at once, but over a period of several years. The objectives of this land policy were recently expressed by the Honourable N. E. Tanner, Minister of Lands and Forests, in the following statement:

> In order to encourage and enable residents of Alberta, and particularly the sons and daughters of Alberta farmers, to establish themselves on lands suitable for agricultural purposes, a homestead lease policy has been instituted by the Government.
>
> This policy provides that those who wish to take advantage of the opportunity offered, may take a homestead lease, with the understanding that if they carry out certain cultivation requirements and live on the land for 50 percent of the time, they can become the owners. Settlement is restricted to lands suitable for agricultural purposes and to areas reasonably accessible to roads and other transportation, where social services, such as schools, hospitals, etc., can be made available as readily and economically as possible.
>
> Lands which are not suitable for agricultural purposes are made available under the long term grazing leases. To ensure proper utilization and conservation of such grazing lands, periodic inspections are made by a Government representative, and a rental is charged based on the carrying capacity of the land and the current price of cattle.
>
> It is also the Government's policy to make and establish other regulations as necessity arises for the disposition of lands by sale or lease under such terms as are considered fair and equitable to the purchaser or lessee, and to the Government as landlord.
>
> Lands which are especially suitable for the growing of merchantable timber, or trees, for protection to water sheds, are reserved for that purpose, and are not made available for settlement.[5]

To meet the problems mentioned previously and to comply with the policy objectives the province took the following action:

In 1939 the granting of homesteads was discontinued and was replaced by an agricultural lease policy that was later known as the Homestead Lease policy. Leases are available only to persons who are veterans of World War II, and to persons who have resided in the Province of Alberta for two years prior to making application for a lease.

Leases are granted on areas up to 320 acres for a term of 20 years, renewable for a further term of 20 years. After completing five years' cultivation and residence duties, a lessee is permitted to purchase on the basis of $100 for a 160 acre unit and $1.25 for each additional acre, or $300 for 320 acres. This price is reduced by 20 percent for each additional year's duties completed until 10 years' duties have been performed, when title is granted free of charge. To assist a lessee to become established, no rent by crop share is payable during the three years immediately following the issue of a lease, and thereafter a one-eighth crop share is payable on the area required to be in crop each year as shown

[5] This was prepared in response to a request for a statement of Alberta's public land policy.

on the schedule in the lease contract. A one-fourth share is payable on land which was under cultivation when the lease is issued. A portion of the crop share collected is paid by the Department of Lands and Forests to the taxation authorities in lieu of taxes, which means that a lessee, unlike the former homesteader, obtains title with no tax debt against the land.

To restrict settlement into those areas where social services are reasonably available and also reduce the danger of forest fires, the Province is divided into two zones for land settlement purposes. In the restricted zone all forms of land settlement are prohibited, but persons are allowed in this area for such commercial purposes as trapping, lumbering, mining, etc. In the settlement zone applications for land are accepted, and to insure that only lands suitable for cultivation are leased for settlement purposes, the land applied for is carefully inspected and classified as to use before a lease is granted. As the supply of available lands suitable for settlement and located in the settlement zone is exhausted, the lands in the restricted zone are withdrawn and made available for settlement.

Since 1939 the province has issued over 5,000 homestead leases covering well over one million acres.

It is not the general policy to screen applicants, and any person who meets the necessary qualifications as to age, citizenship, residence requirements, and who does not own other land, may apply for a homestead lease. Nevertheless, classifying the land before a lease is issued and withholding lands not suitable for settlement helps to insure that as far as acquiring suitable land is concerned, the applicant has a fair chance of success. There are other factors however, such as personal characteristics, available capital necessary for clearing and breaking, available water supply, establishment of a suitable crop rotation, the adoption of a suitable farm management plan, all of which influence a settler's chance of success or failure in establishing a self-supporting farm unit.

While the homestead lease policy overcomes several of the adverse effects of the former Dominion homestead policy, nevertheless it has some limitations, which are as follows:

A lessee usually has limited resources, and since he cannot use the lease as security for obtaining credit, he is often definitely restricted in respect to capital, although in many cases lessees are sons and daughters of establishing farmers who assist them in becoming established.

When a lease is granted, the Department of Lands and Forests, as landlord, takes no direct action to insure that a proper crop rotation system is followed or efficient farming practices are adopted, except to insist on the performance of the necessary residence and cultivation duties. It is believed more action could be taken along this line with beneficial results; nevertheless, it is doubtful if such action is, at the present time, politically feasible.

There is no doubt that financial assistance and more direct technical supervision of the lessee's operations would reduce the number of failures. Nevertheless, there is always a danger of establishing a land policy that gives too much assistance to the farmer, eventually leading up to a point where the lessee loses his freedom of action and expects and depends on government help to the detriment of his own initiative.

The crop share rental as it applies to the homestead leases has certain limitations in regard to flexibility; for example, it is not adaptable to feed crops and livestock enterprises nor to the production of legume crops, and in some cases it tends to discourage good farm practices. As yet a suitable method has not been found of applying a cash rental, which of necessity if it were to be equitable would have to take into account variations in price and especially variations in production, as there is a fair degree of risk of crop failure in most of the farming areas of the province.

In 1947 and 1948 the Provincial Government commenced the land clearing and breaking project covering 150,000 acres, in units of 320 acres each. Contracts were let for the clearing and breaking of land for $25 per acre. As the clearing and breaking of units is completed, veterans receive priority under the Homestead Lease regulations in obtaining a lease of a unit. Each unit has about 250 acres under cultivation. The lessee is required to crop the cultivated area and pay a one-quarter-crop share for 10 years, and in addition, perform the usual residence duties before obtaining title to the land. About 150 of these leases have been issued to date.

While a person obtaining a lease of lands, cleared and broken, has certain advantages over a person obtaining a lease on unimproved lands, nevertheless, from the Government's standpoint, there are certain disadvantages. In the first place, very few veterans starting farming operations have sufficient funds to buy the necessary seed and equipment to farm so much cultivated land. Consequently, in order to protect its investment of $25 per acre, the Government often finds it necessary to finance the purchase of seed. It does not appear to be a good policy from the standpoint of the Government, or for the morale of the lessee, for the Government to pay the total cost and the lessee none of the cost, by cash or labor (except for root picking), for the clearing and breaking performed on the leased land. Furthermore, the purpose of the homestead policy is primarily to assist persons through their own efforts and initiative to establish themselves on economic farm units. It is agreed most settlers need some financial assistance; however, I believe such assistance could be given to the homestead lessees by the Government's guaranteeing loans up to a limited amount made to the lessee through the regular government loan agencies. The money obtained could be spent to assist the lessee, but not to cover the total cost of clearing and breaking or other permanent improvement.

New Grazing Policy

In order to consolidate the administration of all public lands under one department and in order to have a more uniform policy for public lands, all tax recovery lands located in local improvement districts and administered by the Department of Municipal Affairs were transferred in the early 1930's to the Department of Lands and Forests for administration purposes. As a further step towards consolidation of the administration of public lands, an act was passed in 1937 which authorized the Department of Lands and Forests to collect taxes as well as rental on all public grazing lands. The taxes are equal in amount to the rental and are transferred to the taxation authorities. Prior to 1937 the taxation authorities had difficulty in enforcing collections for taxes on public lands, as public lands cannot be taken by tax recovery proceedings for nonpayment of taxes.

In order to establish a rental policy which would be based on the price of cattle and the carrying capacity of the lands, a special committee was appointed in 1938 to investigate the problem. The committee included representatives from the Western Stock Growers' Association, an association composed of ranchers, and a representative from the Department of Lands and Forests.

In their report[6] a simple formula was proposed by which the rental due in any year might be readily determined. The formula was as follows:

$$\frac{1}{10} \times \frac{250 \times P}{G.C.} = \text{rental and taxes per acre.}$$

$\frac{1}{10}$ = share of total forage value retained by Government as taxes and rental.

250 = annual gain in pounds of beef on grass. This is a conservative figure derived from experiments conducted in Alberta and Montana.

P = average price of all grades of cattle except feed calves sold on the Calgary stock market from July to December, inclusive, for the previous year.

G.C. = grazing capacity, the number of acres required to graze one mature beef animal on a 12-month basis.

In introducing the new rental system it was necessary to establish the grazing capacities of all grazing lands. While four principal grazing capacity zones were established for the Province, it has been the policy to make a special inspection and establish the grazing capacities for each grazing lease separately.

[6] *Grazing Rate Report*, by C. Graham Anderson.

In 1945 this new grazing rental policy was applied to all grazing leases and annual grazing permits. By prohibiting overgrazing, conservation of the grazing areas has been greatly enhanced. It also insures the rancher a rental which will fluctuate with the price of cattle and the grazing capacity of the lands held under lease, which helps him to meet his annual rental charges.

A lessee complying with the terms of a lease has security of tenure for the 20-year term of the lease and at the end of that time may apply for a renewal. Furthermore, a lessee may, with departmental approval, assign his lease and sell to the assignee any improvements which he has placed on the leased lands.

Approximately 3,500 grazing leases have been issued covering about five million acres.

The present grazing policy has met with a considerable amount of success and has helped to maintain and, in some cases, improve the condition of the grazing lands. However, to give further improvement to the range condition it is felt that more positive action is needed through a policy of limited financial assistance which would encourage regrassing programs, development of adequate water supplies, eradication of brush and poisonous weeds, etc. At the present time, the Department of Lands and Forests and the Western Stock Growers' Association are investigating this problem and will be presenting a report to the Government in the near future. Perhaps the logical way to attack the problem of range improvement is by range management, which would involve trained men inspecting each grazing lease area and working out with the rancher a range management plan suitable to his conditions. The Government could then encourage the rancher to carry it out through limited financial help.

Through promoting and encouraging the development of community pastures progress has been made in assisting farmers and ranchers in developing economic farm and ranch units. Perhaps more could be done, as the opportunity arises, to adjust each ranch unit to a more economical size.

Adjustment of Settlement

As early as 1891 the Dominion Government's policy of rapid settlement without regard to land use was beginning to show its weakness, and it became necessary for the Government to grant assistance to settlers in southeastern Alberta.

Between 1900 and 1916 reasonably good crops were obtained in this area, and despite the previous warnings, this arid section was almost completely settled. By 1921 the distress among farmers in this area was a matter of grave concern; but it was not until 1938, after the resources were transferred to the Province and after four commissions appointed by

the Provincial Government had submitted reports, that the whole southeastern area was consolidated under one administration by the Special Areas Act. This act was designed to correct the mistakes of a land settlement policy which had placed thousands of settlers on lands capable of sustaining only a fraction of the number. The function of the Special Areas Act was essentially to develop a land policy that would insure proper use of the lands within the area. To accomplish this goal the Department of Lands and Forests was granted full administrative authority in this area, having control over roads, schools, hospitals, taxes, etc., in addition to the control of all public lands, both unalienated Crown Lands and lands reverted to the Crown through tax recovery proceedings. Tax recovery lands comprised about half of the area.

Regulations were established to prevent any new settlement, and the land classification of the Dominion Agricultural Economic Surveys was adopted. Nonarable public lands were leased for grazing only, and regrassing of abandoned lands was encouraged. In 1948 the administration of the special areas was turned over to the Department of Municipal Affairs with the hope that eventually the readjustment of land use would be completed and local government restored.

I believe it is fair to say that, despite the errors made and the tendency of established settlement to resist change, considerable progress has been made in establishing a form of land use that is capable of providing a reasonable standard of living to the settlers of the area. However, in the special areas, as well as throughout all of Alberta, it has been found necessary for the Government to maintain ownership of the marginal lands that should not be cultivated, to insure that such lands will not be cultivated during periods of favorable prices and moisture conditions. Consequently, it is not the general policy to sell grazing lands.

In addition to the land settlement policy as embodied in the homestead lease regulations, and the grazing policy as embodied in the grazing lease regulation, the department disposes of public lands under various other forms of leases, licenses, annual permits and by sale. The regulations are designed to meet special forms of land disposition. Periodically, lands not considered suitable for a homestead lease and school lands in the settlement zone are offered for sale by public auction. No sale is made where it is considered the lands will be misused if title is issued, such as grazing lands in southeastern Alberta, lands covered with commercial timber, or other lands in which, due to their location or physical characteristics, it is considered in the best interests of the Government to retain title.

Timber lands are not sold, but rights to cut timber are granted by the Forestry Division under authority of Timber Permits and Timber Berths, which require royalty on the amount of forest products cut.

Renne states that "a policy is a specific plan of action, or method of achieving desired ends followed for a considerable period of time," and further that the "desired ends in land economics are to develop the principles of land use and appropriation as a means to improve the economic and social conditions of living."[7]

Perhaps, then, the fundamental problem in land use is to know what rights should be granted to the land operator and what rights should be maintained by the Government to insure proper land use.

There is a definite desire on the part of most people in Alberta and Canada to own land by title rather than to lease land, even though better terms may be granted by leasing. This undoubtedly is the result of past land policies which gave insecurity of tenure to tenants and to the general feeling that landownership gives more prestige than tenancy.

Perhaps, by education and by the establishment of adequate tenancy laws as in England and Europe, this general attitude towards owning versus renting land could be changed. Nevertheless, until this attitude is changed, ownership is preferable to renting, as in general better land use practices are followed by landowners than by tenants.

Once title has been granted in fee simple the Department of Lands and Forests has no further control over the use made of the land. In past years this presented a problem, for it was soon apparent that the Government had a definite interest in land use. For example, when crops failed, whether due to misuse of the land or otherwise, the Government found it was called upon to give assistance to the settlers. Furthermore, if the Government is responsible for granting assistance to farmers who are in financial difficulties, due to the misuse of the land, then it is only logical that the Government must have some control over land use. However, it was not until recently that any definite action was taken by the Government through the Department of Agriculture to control land use after title had been issued in fee simple.

The Noxious Weeds Act

This act gives the Provincial Department of Agriculture power to appoint weed inspectors who have authority, under the act, to issue a notice requiring a farmer to destroy noxious weeds found on his land and also where necessary to prevent weed infested land from being cropped. Where the farmer fails to comply with the notice, the weed inspector is authorized to take whatever action is necessary for the destruction of the weeds and the cost is added to and forms part of the taxes levied against the land.

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[7] Ronald C. Renne, *Land Economics*, p. 11.

Agricultural Service Board Act

This act has much wider powers over land use than any former act in force in the Province of Alberta and I believe in other provinces of Canada. Any Municipal District wishing to come under the act is required to establish an Agricultural Service Board. The duties of the Service Board are to advise the Municipal Council with respect to weed control, soil and water conservation, methods of proper land utilization for individual farmers, and to promote agricultural policies to meet the needs of the district.

Where the Board after investigation finds a farm in an unproductive condition through weed infestation, wind and water erosion, or for any other reason, it works out with the farmer the farming practices which, if followed over a period of years, will restore the productivity of the land. If the farmer does not make satisfactory progress or refuses to follow the plan as set out by the Board, the latter has the power to take over the operation of the farm. When productivity has been restored, the land is turned back to the owner and any net deficit resulting from the operation of the farm is added to and forms part of the taxes.

Although the act has been in force for only a short time, approximately six years, the results are encouraging. However, it is doubtful if the desired ends of a land policy can be obtained solely by use of the police power. It is believed there is still more that may be done to develop better land use practices through taxation, and by encouraging and assisting the farmer to adopt better farm management practices.

In regard to taxation, the Provincial Government in 1945 making an assessment of all agricultural lands for taxation purposes attempted to base the assessment on the productivity of the land by taking into account soil, climate, etc. This is a step in the right direction toward encouraging good land use practices through equitable taxation based on the productivity of the land.

In regard to farm management the Dominion Department of Agriculture and the universities have done much to improve the state-of-the-arts of agriculture and to encourage better land use practices by developing more productive varieties of grain and types of livestock, by soil classification and land use classification, by gathering statistics and through economic surveys. The Provincial Department of Agriculture, through the district agricultural service, has done much to acquaint the farmer with the improved varieties of grain, types of livestock, types of soils, agricultural statistics, etc. Also the Dominion Government, through the Prairie Farm Rehabilitation Act, has assisted the prairie farmers in obtaining water supplies and developing irrigation projects. All of this has been of tremendous value to the farmer and is primarily responsible for the agricultural advancements made in the past. However, up to the

present time the problem of assisting the individual farmer to organize his farm operations and to apply the knowledge available in establishing a proper farm management plan has not been solved to any extent. Perhaps this is the greatest need today in establishing desirable land use practices in Alberta. It is encouraging to note that during the last two years the Department of Agriculture, through the district agricultural service, has started a program of demonstrating the value of farm management to the farmers, and that the University of Alberta is now giving courses in farm management.

In reviewing the public land policies of the past it is evident that man's attitude toward land is constantly changing. This circumstance is reflected by changes in public land policies.

During the nineteenth century, it was the general opinion that the free play of competitive forces would automatically result in the optimum use of the land and other natural resources. The fact that this did not occur, and that the Government was forced to spend millions of dollars in bringing about readjustments in land use, resulted in a gradual change of attitude toward land which eventually led to policies giving more control over land use.

During the past 20 years the realization of the need of land conservation has been growing. Until recently, however, land policies have been mainly concerned with the first function of conservation, which is to maintain and conserve the land resources. In the last few years the second function of conservation, which is to improve the land resources, has been recognized more and more and is beginning to have an effect on public land policies.

These changes in attitudes toward land and the subsequent changes in land policies are leading to constantly increasing government control over land use. To harmonize governmental control over land use with the individual's right for freedom of action and equality is a major problem in formulating and administering present and future public land policies.

DISCUSSION

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Mr. Wood's interesting and informative paper on public land policy in Alberta reveals many points of striking similarity with that of the United States and at the same time several rather important differences.

The basic situations in the two countries have been in many respects similar, and this has naturally led to analogous land policies. Each is a relatively young country and each has been a frontier country during the early years of its history. There was an abundance of land but a scarcity of people and of industry.

Each country has evolved from its frontier condition, first into a primary agricultural area, and second, into a diversified agricultural, industrial economy. Each country in its growth period faced the need for improved transportation services and for better educational facilities, and each used the public lands as a means of financing these greatly desired developments. In each country political considerations, particularly the need for growth of the country to prevent encroachment by other political powers, was a dominant factor in land policy. It is a little shocking to an uninformed American to realize that Canadian land policy in the latter half of the nineteenth century was dominated by a fear of encroachment or invasion by the United States. It reminds me of the shocked astonishment with which a Canadian fellow graduate student at Harvard some years ago discovered that the British had burnt the White House in Washington in 1812. That such events or situations are now both forgotten and no longer important is, of course, further testimony to the splendid friendly working relationships between the two countries today.

Many of the practices of public land settlement were similar in the two countries. The cadastral survey system of western Canada and of the western United States are closely similar. Likewise, their system of keeping land records is similar. When I visited the office of the Alberta Department of Lands and Forests in Edmonton in the summer of 1949 I thought I was in one of our own district land offices. Each country has made extensive use of land grants to encourage transportation and educational services. Each has had a system of homesteading land under which the actual settler resided on the land and improved it and obtained title for a nominal cost.

Land laws and land policy in the two countries display many of the same or closely similar weaknesses. In each, there was indiscriminate settlement of land without regard to its adaptability for agriculture and without regard for its ability to support necessary social systems. In neither country was there a system of land classification until relatively recent years. In fact, general classification of public land in the United States began with the Taylor Grazing Act passed in 1934 and began in Alberta in 1939. Lacking a classification of land, the policy of allowing entries of uniform acreage was most unsatisfactory in both countries. Homesteads of 160 or 320 acres were permitted not only in the areas where this acreage was inadequate for farming operations, but also in areas where much larger acreages were necessary for successful livestock raising or other land use. There seems to have been a tendency common to both countries for the legislators to ignore such information as did exist regarding the capabilities of the land and to refuse to adopt legislation appropriate to the physical qualities of the land.

Each country has experienced a changing philosophy with regard to land and particularly with regard to public land. Whereas the original objective in both countries apparently was for complete transfer of land from public to private ownership, in time it came to be realized that this was not the soundest and best policy. Instead, the viewpoint came into general acceptance that certain types of land can most wisely continue in public ownership and management. As a corollary of this, the philosophy of exercising a considerable selectivity in the disposal of public land came to be accepted. Applications for land were no longer granted merely because they were made, but rather only on the basis that the land was suitable for the use for which it was sought. The judgment of

the informed government expert has gradually come to be substituted for the judgment of the uninformed land settler or land speculator. Likewise, in both countries there has been a trend away from permitting the unrestricted use or abuse of privately owned land. It is coming to be recognized that the landowner has a certain obligation to society and to his neighbors to use his land wisely and without injury to the land or to others. Apparently, Alberta has employed its police powers more rigorously than we have used the same powers here.

To this long list of basic similarities of public land policy and management in the two countries must be added a brief list of some of the more important differences. Most striking of all is the fact that in Canada the administration of public lands has rather generally been transferred from Dominion to Provincial Governments at the time when the provinces were fairly well developed economically and politically. In the United States, grants of land were made by the Federal Government to the states, but all suggestions for transfer of remaining federal land to state ownership and jurisdiction have been rejected, and in fact there is today not much general sentiment in the states themselves for such transfer.

Although American land history has had its private land claims, there is nothing in our experience comparable to that of Canada with the Hudson's Bay Company.

Of special interest to a public land manager in the United States is the fact that both public domain land and tax foreclosed lands in Alberta are administered by the same agency. In the United States we have most public land administered by federal agencies with relatively smaller amounts by state agencies. Tax foreclosed lands, however, are in most states the responsibility of the counties. Had the extensive tax delinquencies of the Great Depression of the 1930's continued more or less indefinitely, there might well have been a suggestion that these lands be turned over to state or even to federal agencies for administration and management.

The methods of managing grazing and forest lands seem to be different in Alberta and in the United States. We have generally exercised closer supervision over the actual operations of the livestock owners and the forest operators in terms of numbers of livestock, seasons of use, range management practices, logging practices, slash disposal, fire control and the like, than seems to be the case in Alberta. There seems to be a hint in Mr. Wood's paper that more supervision along these lines may in time be necessary in Alberta.

It is interesting to note that Mr. Wood's paper contains very little reference to mineral production and use of public lands for mineral production, whereas this subject would be a relatively important one in the United States. He makes no mention of multiple-purpose use, which again would be a major topic of discussion on public land management in the United States. Whether this is due to difference in terminology, the lack of experience, or lack of time in which to tell us about them, or whether practices are really different, is not clear. It is also interesting to note that Alberta has in recent years frequently leased agricultural land, whereas the leasing of public land for agricultural purposes is uncommon in the United States.

Although some differences appear in public land administration when Alberta and the western United States are compared, one cannot but be more impressed by the similarities.

DISCUSSION

J. COKE
Department of Agriculture, Canada

My first observation is that in the provinces where land resources were given over to provincial control at the time of Confederation, land policies adopted were not very different from those which the Government of Canada applied in the administration of Crown Lands in the Prairie Provinces. Undoubtedly mistakes were made in the West, too, and their correction is still in process. It may have been a little unfortunate that the control of public lands in the Prairie Provinces was handed over to the provincial governments in 1930, although it is rather obvious that the combination of drought and low prices could hardly have been foreseen at the time the decision was made.

Mr. Wood has already referred to the Prairie Farm Rehabilitation Act and to agreements between the Government of Canada and the Province of Alberta in respect to the Eastern Rocky Mountain Conservation Board and the St. Mary's-Milk River irrigation development. I think we could explore the implications of these agreements rather more fully than has been done up to the present time. Another rather important cooperative arrangement between the Government of Canada and the provincial governments in the Prairie Provinces has been the establishment of a Prairie Provinces Water Resources Board, which studies and recommends to governments allocations of waters in rivers which flow across provincial boundaries.

Another activity that should be referred to is the effort of the Government of Canada to assist in the adjustment of settlement through an exchange of properties in areas in Saskatchewan which have been proved unsuitable for agricultural production and those in irrigated areas in Alberta. Mr. Wood has pointed out variations in the acceptance of the Prairie Farm Rehabilitation Program in the different provinces; or perhaps more accurately, somewhat different policies are in effect in Saskatchewan and Alberta. Efforts are being made to bring these policies into line on mutually acceptable bases.

In regard to the eastern Provinces, most of the land still available for settlement is in the central Provinces of Ontario and Quebec. Where settlement is in process in the Maritime Provinces, it is mainly a secondary movement. The Province of Nova Scotia has a policy of reappraisal of farms which have been abandoned which is designed to provide land for those who may wish to farm in Nova Scotia, either veterans of World War II, civilians, or incoming citizens from other lands.

There has been in recent times a more general recognition of the need for an examination of the potential productivity of land which a new settler may take up. In practically all of the provinces some form of reconnaissance soil survey is provided. In some provinces it is quite complete; in others not nearly so well advanced and in the new areas, all too little has been done.

There is still an urge to own land. The frontier has not quite disappeared. It is in evidence, as Mr. Wood pointed out, in northern Alberta, in the Peace River block of British Columbia, in Ontario and Quebec, and in northern New Brunswick. In the new Province of Newfoundland, areas suitable for agricultural production are available on very reasonable terms.

There has been an expansion within the last decade in mechanization of the

methods of land clearing. The axe and crosscut saw are now outmoded in clearing timber. They have been replaced by the bulldozer, the brush piler and large breaking ploughs. In some areas, public assistance is given to drain blocks of land that are considered to be suitable for land settlement. In Ontario, land is still available in 160-acre blocks at 50 cents an acre, with the stipulation of six months' residence annually for three years, and the erection of buildings of a prescribed minimum size. Most of this land is in the Rainy River district of northern Ontario and in the Northern Clay Belt from Matheson to Cochrane and Kapuskasing. The Clay Belt extends over into northwestern Quebec and substantial settlement has taken place in northwestern Quebec in recent years.

In Ontario a new settler may be assisted in clearing and breaking land. He is subsidized at 50 percent of the cost up to a maximum of $12 per acre for clearing and $6 per acre for breaking. The maximum in any one year is limited to 10 acres of land clearing and breaking. Farmers who have more than 80 acres under the plough are not eligible for subsidy. Further assistance is given for drainage, the provision of drainage outlets, and in drilling wells.

Little effort has been made in Ontario to provide for social services beyond the building of main roads, but in Quebec a highly developed system has been introduced, whereby churches, schools, health units, stores, and other facilities are developed rapidly and as soon after settlement takes place as is possible.

In Quebec, people are encouraged to settle on land by liberal public assistance programs, amounting to about $3,225 for clearing, breaking, construction of buildings, provision of wells and other facilities. Such assistance is made available over a period of years.

Mr. Wood has referred to the desire to own land. Many of our people came to this country in order to gain possession of land—something that was unattainable in their home lands. Tenancy has never been a very large factor in Canada. Of course, as one might expect, it is largely confined to cash crop areas. This means western Canada and southwestern Ontario. Grain crops, sugar beets, and tobacco are adapted to share-cropping and some share tenancy has prevailed on livestock farms, both in the East and West, but the general rule seems to be that cash rental is preferred on other than cash crop farms. Even between 1941 and 1946 in the Prairie Provinces, adjustment between ownership and tenancy was in the neighbourhood of five percent. In other words, ownership increased by five percent and tenancy decreased by about that much. There has been no appreciable increase in the number of part-owners and part-tenants. One might have expected this to be the case, since farmers might readily rent land in order to adjust the size of farms in terms of land for more effective utilization of machinery. We do not have recent figures on tenancy and ownership for the country as a whole. These data are now being compiled in the 1951 Census. There has been increasing interest in arrangements for the retention in families of farms which have been owned for three or four generations. This is a relatively recent development.

It may be worth noting that in connection with postwar immigration, the majority of immigrants are going into industrial employment, rather than settling on land, as was the case in earlier times.

Reference to land policy in Canada would be incomplete without indicating that in the postwar period approximately 55,000 veterans have been settled on land. About 23,000 of these have been placed on small holdings. More than 800 fishermen have been established on land under the Veterans' Land Act.

DISCUSSION

R. J. PENN
University of Wisconsin

Mr. Wood has undertaken a very difficult assignment. It is not easy in a short paper to describe many years of land policy and draw from it the significant issues. Those of us in land economics at least are glad to have Mr. Wood's paper available. It contains considerable information not previously in the literature of the field. I will make only one brief comment directly on Mr. Wood's paper. It is that he has emphasized primarily the public land programs which have been carried on by the Provincial and Dominion Government. From my very limited acquaintance with Canadian experience, I know the people of Canada have made some notable contributions to methods of policy formulation. I should like Mr. Wood to have given us somewhat more of this experience.

But I intend to devote the few minutes I have today to discuss the question briefly—Why do we have a paper on land policy at all? Why does Marion Clawson write a book on *Uncle Sam's Acres,* Hibbard a book on *History of Land Policy,* and Peffer a book on the *Closing of the Public Domain*? (I have heard that some members of the Association have decided that they will define land as passive and no particular significance in the field of economics.)

We have singled out land in the past and will continue to do so in the future (1) because it has been one of the main surplus resources (in Canada and the United States) available for the development of our economies, and (2) because the peculiar institutions surrounding land are very often strategic or limiting factors in bringing about desirable land use adjustments.

We in the United States, like you in Canada, found ourselves with a large amount of land resources—farm land, forests, minerals, etc. We had some national objectives and we attempted to manage or dispose of our land resources in a way that would further our objectives. For a while the Federal Government needed cash very badly. In that period we attempted to manage the public domain so as to get as much money for the Federal Treasury as possible. Later we attempted to encourage settlement and development of the land. We gave land to the states for internal improvements, for educational facilities, for irrigation development, etc. We gave land to railroads to build our transport system. And we gave land to any citizen if he would live on it and make improvements on it.

The surplus food from our midwest farm area made it possible for people to live in cities and work in our developing industries. Surplus food is now one of the critical needs in underdeveloped areas if they are to industrialize. Timber from our Great Lakes forest area played a vital part in the development of our midwest metropolitan areas, including Chicago. It actually furnished the lumber needed to build the buildings, but also in the process furnished liquid capital for industrial investment. It is no accident that many of the big lumber companies and Chicago banking houses of that day were jointly owned or very closely integrated. In this case the market was functioning to drain off land resources for industrialization. However, the public developed a policy during the "conservation era" between 1890 and 1910, that something more than the existing market and price relationship was necessary if we were to use our forests in the best interest of the public—including both current and future interest.

In short, we have used our land resources to accomplish our objectives. We recognize that if we are to have a land resource base for our economy we must not only use them wisely without waste, but we must also invest in their development. Land programs are evidence of public action taken in those areas where individual response to price did not adequately meet the public interest.

Another major reason for giving attention to land policies and programs is that institutions peculiar to land are very often the strategic factor in land use adjustment. We have had in the past and still have many areas not in the best land use—problem areas or areas of underemployment. It is not so difficult to find out how poor people are, but it is a real challenge to work out ways by which people can improve their lots with the resources at hand. It is in this type of analysis that institutions are of vital importance. Land programs and policies are concerned with changing the land rules so that desirable adjustments and improvements in land use can take place—so that the people using the land can increase their standards of living. I would hope that the time would not be far off when those who have written so much about "imperfections in the capital market" would take the next logical step and say something about how to remove those imperfections.

We in Wisconsin have made some real progress in one so-called problem area. We had cut over much of our northern forest area by 1920 and we were hoping the "plow would follow the axe." By 1924 it was evident we had extended farming too far and owners were relinquishing title to great areas of land for taxes. The policy was formulated that the "cut over" should be changed back to a forest region. (Nearly five million acres of public forests have been established from these tax reverted areas.) A number of our institutions had to be revised as well as new rules developed. For instance, our tax laws on forest land were revised so that the individual could pay taxes at the time of harvest and on the value of the product rather than face an unknown tax payable once a year. About half our counties have rural zoning ordinances which restrict large areas against settlement and agriculture. Today the agricultural problems of northern Wisconsin are not of much significance. I should hasten to add, however, that new land problems are developing around our expanding recreation industry and in connection with the use and disposal of wood products from our forests.

Land tenure arrangements are very often the critical factor in individual farm adjustments, such as increasing the size of farm, changing the rotation, or improving practices. The tenure arrangements govern the division of costs and the rights to the product. Very often the division is such that the one bearing the cost does not receive the return. Hence the adoption of the practice may be prevented, even though it has been clearly demonstrated to return more than costs. Although adjustment in farm size is extremely complex, including the physical and spatial characteristics of land as well as the displacement of some farms, we have found that land tenure arrangements are rather fundamental to those adjustments.

When we focus on land policies and programs we direct our attention to analysis of the will of people and how to accomplish that will. We direct our attention to the areas where land is strategic in accomplishing our objectives. We are working on ideas and procedures that man can use to improve his lot. These, I think, are some of the reasons our time and energy have been well spent on land policies and programs.

LAND CLASSIFICATION AND RURAL ZONING

Chairman: J. Coke, Department of Agriculture, Canada

RURAL ZONING, PRESENT AND FUTURE

ERLING D. SOLBERG
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New Rural Zoning Problems

TODAY, new forces are affecting the farming community on the urban fringe. Cities are bursting at their seams. Good roads and automobiles permit spreading the urban populace over the countryside. Commuter zones today embrace expanded areas of rural land. New areas of land-use maladjustments are appearing. Such areas of instability sometimes extend 30 to 50 miles beyond city limits and often overlap fringe areas of neighboring cities. Suburbanization is reaching out, bringing into the rural community scattered residential subdivisions and homes, business centers and ribbon commercial areas, industries, and part-time farms. A condition of haphazard growth and idle land too often prevails; planned development seems to be the exception. Added pressures that cause change on the urban fringe stem from the purchase by city dwellers of farm properties as an investment, or as a form of security and safety, or for other reasons.

The impact of these multiple pressures on the urban fringe agricultural community is often devastating. Land prices rise beyond the reach of operating farmers; taxes reflect speculative land values that may never be realized; special assessments for schools, water supply, sewers, or other improvements are voted by the nonfarm landowners, and development costs are thereby shifted to farm lands that may not be "ripe" for suburbanization for decades. Tax pressures, consequently, may force premature subdivision of good farms or end in tax foreclosure. A rural community's capacity to produce food may be as effectively destroyed by the erosion of premature suburbanization as by the erosion of its soils.

Today's new problems, particularly on the urban fringe, call for the extension of conventional types of zoning regulations, and for the exercise of other zoning powers, sometimes in new and unconventional ways. Of course, zoning alone may not be enough. Other regulatory and remedial measures also may need to be taken. In order to understand how rural zoning may be used to meet these new problems—how zoning regulations and techniques may be adapted to attain new goals—it will be necessary to take a look at zoning in the past and to define a few terms.

Development of Zoning

The earliest zoning in the United States consisted of regulations banning powder mills from all but the outskirts of our colonial settlements. In 1692, Massachusetts authorized certain towns to assign areas where least offensive for the location of slaughterhouses, stillhouses, and houses for trying tallow and currying leather. Much later, in 1916, the first comprehensive zoning ordinance was enacted in New York City. In 1923, Wisconsin extended zoning to suburban areas, and, in 1929, authorized zoning in the open country. Today, 38 states authorize zoning of a part of or of all unincorporated portions of such states.

But what is meant by the term "zoning"? What is the character of the various types of regulatory powers that are embraced by that concept? Zoning has been defined as the regulation by districts under police power of the height, bulk, and use of buildings, the use of land, and the density of population. This definition will become clearer after an examination of each stick of the bundle of differing but related types of controls that constitute the whole. Zoning involves four major kinds of directives, namely: use, site-area, building dimensions, and density of population. Each of the four, in turn, is composed of several separable parts. For example, the use controls imposed may pertain to buildings only, to land only, or, as is usually the case, to both. A zoning ordinance may create only suburban type zoning districts—residential, commercial, and industrial—or it may establish only open country zones—agricultural, forestry, recreational, and grazing—or districts of both types may be formed. Within such districts multiple variations of permitted or prohibited uses may exist.

Similarly, site-area regulations adopted may control minimum size of lots or tracts, the percentage of the tract that may be occupied by buildings, the size of side or rear yards, courts, or other open spaces, and the set-back of buildings from roads. Building dimension restrictions, moreover, may pertain only to the height of buildings, as is frequently the case, or the regulations may also control the number of stories, size, bulk, kind, and design of buildings. Density of population may be controlled by limiting the number of families permitted per lot or tract, or by prescribing in square feet the minimum areas of ground or floor space required per family.

Zoning developed in crowded cities. Its basic regulations were shaped for urban ends. Later, building on this urban created base, zoning regulations and techniques were developed for intensive land-use areas on the urban fringe and then for open country areas. The future, as we shall see later, promises further adaptation of zoning to serve rural communities.

At this point, a word needs to be said about the functions and character of zoning enabling laws.

Rural Zoning Enabling Laws

Rural units of government must obtain their power to zone from the State. Usually this power is conferred by zoning enabling laws enacted by the various state legislatures. Thirty-eight states have passed such laws empowering any or designated classes of counties, towns or townships, or other local units of government, to adopt rural zoning ordinances. In total, 175 different enabling laws are in force in the 38 states that authorize zoning in unincorporated areas. Over 100 of these acts apply to counties, 50 apply to towns or townships, and 23 apply to miscellaneous governmental units.

The field of regulatory power that may be exercised by a local government, both as to areas that may be zoned and as to types of regulations that may be imposed, depends upon the particular law conferring such zoning authority. In this respect, the enabling statutes vary materially. The great majority of counties, towns, or townships empowered to adopt ordinances may zone the unincorporated portion of the territory within their respective boundaries. A few county zoning enabling laws limit such territories to areas adjacent to incorporated municipalities, to strips along certain highways, to areas near military reservations, or to densely populated rural areas of limited size.

Most zoning enabling statutes authorize the rural units of government empowered to zone to exercise all of the four main classes of powers mentioned earlier, namely, dimension, site-area, density, and use zoning powers. However, use regulatory powers, under one or more enabling laws in 28 states, presumably may be exercised only in suburban or intensive land-use areas. Besides, 30 zoning enabling statutes in 17 states exempt agricultural activities from zoning regulations. Most of these laws prohibit any regulation or restriction of the use of land, and the use, repair, alteration, or construction of buildings or structures for agricultural purposes. These limitations, however, do not mean that there can be no zoning regulations imposed in agricultural-type districts in such states. Nonagricultural activities are frequently regulated in such districts for the benefit and protection of the rural community.

County Rural Zoning Ordinances

State zoning enabling laws merely empower the various countries, towns, or townships to enact zoning ordinances. These local units of government, at their discretion, may exercise the authority conferred or they may decline to act. However, if they decide to enact zoning ordi-

nances, they must formulate them within the framework of the enabling laws which govern the types of regulations that may be imposed.

By 1949, rural zoning ordinances had been adopted by 173 counties in 23 states. Wisconsin leads the Nation in number of counties having rural zoning ordinances, with over one half of its counties zoned. In California, 26 of the 58 counties have adopted zoning ordinances. Illinois, Indiana, Nebraska, and Virginia each have ordinances in effect in 10 or more counties, and in seven other states rural zoning ordinances have been enacted by five or more counties.

Because a county has enacted a zoning ordinance, it does not necessarily follow that the entire county has been zoned. Generally, only populous areas are affected by suburban type ordinances, and, frequently, only forested areas are zoned by the open country type. Ordinances combining elements from both types often provide for residual districts that are subject only to minor restrictions or to none at all.

Thirty-five of the 74 county ordinances examined were of the rural comprehensive type. This class of ordinance imposes dimension, site-area, and density of population regulations and, in addition, regulations pertaining to the use of buildings, structures, and land in both suburban and open country areas. The next largest class consists of open country use ordinances, such as are found in northern Michigan, Minnesota, and Wisconsin. Under this type, only use regulations are imposed.

Zoning districts established by the county ordinances examined are of six main types or classes, namely: residential, agricultural, forestry and recreational, commercial, industrial, and residual. Each main class contains several subclasses, the agricultural class consisting of general agricultural, residential-agricultural, and country home districts. General agricultural districts are provided for in 50 percent of the ordinances examined.

Uses regulated in the three agricultural type districts are of nine main classes, namely: residence, agricultural industries, recreation, commerce, public and semi-public, public utility, mining and related activities, and general industrial uses. Zoning restrictions on agricultural activities in general agricultural districts are infrequent, except for regulations pertaining to farms for the disposal of garbage or offal, hog ranches, and livestock feeding and sales yards. A number of states, as has already been mentioned, exempt agricultural activities from zoning regulations. Such exemptions, as interpreted in a few states, do not apply to tracts containing five to 10 acres or less.

Minimum tracts required in country home districts range from 10,000 square feet to five acres. Minimums in residential-agricultural zones range from one-half acre to 20 acres. Under provisions of a few county ordinances, minimum tracts required for each dwelling unit vary, depend-

ing upon whether there is a private well or a public water supply, whether a septic tank or a public sewer is used, and also depending upon soil conditions. Single-family residences are permitted in all agricultural-type districts, and two-family dwellings are permitted in the greater proportion, but multiple-family units are frequently barred. One ordinance prohibits more than eight families from permanently residing on any one farm, irrespective of size of dwelling units.

Various classes of forestry and/or recreational districts have been established in three Lake States, namely, Michigan, Minnesota, and Wisconsin, and in the States of California, Colorado, Utah, and Washington. In Michigan, emphasis has been on recreational districts, and several classes of zones have been developed. Zoning emphasis in some is directed toward retaining to the maximum the natural environmental conditions and, in others, toward guiding the development of commercial "resort" zones.

Principles of Zoning

So much for the past. Admittedly these remarks provide a very sketchy outline of the present status of rural zoning in the United States. Enough has been said, however, to show how urban-created legal raw materials–the basic types of zoning regulations and techniques–have been modified and adapted to serve the rural community. What does the future hold for rural zoning? Experience provides guide-lines for the future. The very diversity of experimentation in the state zoning laboratories–the legislatures and local zoning agencies–offers many leads. Our problem is largely one of adapting what we have been doing in the past to future objectives. The task of devising new zoning directives and methods to attain new goals becomes easier if we keep in mind the basic types of regulations previously discussed, and are cognizant of some limitations of local zoning stemming from the incidence of zoning benefits and from certain local political aspects of zoning; and also if we are advised of various means used by the State to influence the character of local zoning regulations. With that information as a background, we can more readily appreciate the opportunities for adapting existing zoning devices for the solution of new community problems.

Incidence of Zoning Benefits

Benefits from some types of zoning regulations are local, direct, and personal; from others the advantages are indirect, even intangible, and accrue to the locality as a whole or to society generally. For example, zoning regulations intended to create and maintain healthy, convenient, attractive, and efficient neighborhoods may depend primarily on local initiative and action. Here, the character of the regulations imposed and

violations of them have a direct impact on the amenities of the neighborhood properties.

Benefits from other kinds of zoning regulations accrue primarily to the community at large, with lesser or even no advantage resulting to the local neighborhood or its landowners and occupants. Included in this category may be certain types of roadside, watershed, forestry, and recreation district regulations. Roadside zoning regulations may include restrictions or prohibitions on commercial uses and outdoor advertising, and impose off-street parking, set-back, and access controls. Roadside zoning preserves the safety and traffic carrying capacity of the highways. Its benefits accrue primarily to the general public. In fact, the interest of an owner of land adjoining the road often conflicts with the interest of the traveling public.

Benefits resulting from the creation of forestry and/or recreation zoning districts are both local and regional, direct and indirect. Those accruing to forest landowners are ascribed primarily to lessened fire and trespass hazards, and to lower taxes resulting from the need for fewer public services. Owners of recreational lands and the general public both benefit to the extent that zoning helps to maintain or to improve the recreational character of the districts. Other benefits attributed to zoning of watersheds to forest-recreational uses are the stabilization of stream flows and water supply, and the reduction of flood crests and silt flows. These benefits may accrue primarily to downstream water users and to occupants of the flood plain, that is, to people living outside the forest zone.

Ordinances Usually a Local Product

Although the incidence of the benefits from rural zoning may be local, regional, state-wide, or greater, depending upon the character of the regulations adopted, zoning authority customarily is vested by the State in local governments, such as counties, towns, or townships, and other miscellaneous units. Perhaps the public interest would be served if some zoning powers were also exercised at other levels of government. The appropriate level or combination of levels to impose zoning sanctions would seem to depend upon the nature of the problem. The criterion is whichever level can do the best job.

The typical rural-zoning ordinance is a local law adopted by the community for dealing with certain types of existing and prospective land-use and related problems. The ordinance prescribes rules of conduct within the field embraced by its regulations. The field of permissible zoning regulations, however, is limited functionally by the bounds of the authority granted in the enabling law, and it is limited geographically by the boundaries of the local government empowered to zone. More-

over, the scope of regulations actually adopted often is limited in response to individual and group pressures stemming from a divergence of interest between landowners. It is reasonable to expect that types of directives sometimes slighted are those primarily in the general public interest, as distinguished from those conferring specific individual and local benefits. Another factor adversely affecting zoning in many rural communities is the meager budget allowed zoning agencies.

Gradations in State Control of Regulations

Let us turn now to the various means used by the states for influencing the character of local zoning regulations. Six gradations were observed in existing state zoning laws. These gradations suggest various ways available to the states for affecting desirable zoning ends.

The first and the usual means employed is the permissive enabling law. Under this law the State grants zoning powers to some classes of its rural governments and withholds them from others. Moreover, such enabling laws authorize the community to adopt certain types of zoning regulations and impliedly or expressly prohibit others. The local community may exercise some or all of the powers granted, or it may decline to zone.

An added measure of state control over the character of rural-zoning regulations is, no doubt, effected in states that have adopted the second approach and assist local governments with their planning and zoning problems by providing technical guidance. This group of enabling laws designate a state or a regional agency to advise or to participate in the preparation of the original zoning plan.

A third technique is used in a few states. This affirmatively limits the field of choice of zoning regulations by requiring that the community, if it zones, impose regulations of a designated character. Examples of such enabling statutes are an Oklahoma act which lists the characteristics and types of zoning districts that must be created if an ordinance is adopted, a Tennessee statute which excludes from residential districts all nonresidential uses except those enumerated, and a Florida law which designates a 30-foot set-back along named roads.

A fourth and more direct approach is employed in two states that reserve the right to review and veto. In Michigan, county zoning ordinances must be approved by the Department of Economic Development before becoming effective. A Missouri law requires prior approval of proposed county zoning regulations from the State Planning Board, the Commissioner of Health, and the chief engineer of the State Highway Commission. The power of veto, although negative, may be used affirmatively to achieve desirable zoning regulations if the community is strongly inclined to zone.

A Florida roadside zoning law illustrates a fifth, more far-reaching approach. By this statute the Duval County Planning Council is "directed, authorized and empowered" to divide highway protective areas into five classes of districts, namely: commercial, industrial, residential, recreational, and agricultural. This law is not permissive but mandatory. The community is ordered to zone.

The sixth and final gradation is exemplified by another Florida law. Under this law, local zoning regulations are directly imposed by the State. The ordinance, adopted by the Florida Legislature, provides detailed zoning regulations for Virginia Park Subdivision, near Tampa.

Possibilities and Prospects

What is the outlook for rural zoning? Certainly we may expect its extension into new areas. The 10 states that remain without enabling legislation may be expected to confer zoning powers on their local governments. Also, we may expect an enlargement of zoning powers conferred under present enabling statutes, both functionally, by the granting of broader zoning authority, and geographically, by the empowering of other local units of government to zone. Perhaps we will see better regional and community planning and a greater integration in the use of the zoning tool with other land-use regulatory tools. The future may also see the State playing a more direct role in zoning. We may see zoning at the regional or multiple-county level, at a combination of levels, or at the state level. Moreover, the future may bring adaptations in the use of conventional types of zoning regulations and, perhaps, new kinds of regulations. New rural problems and goals call for new zoning techniques. Faint outlines of coming changes, sometimes perhaps experimental, were observed in the zoning enabling laws and ordinances examined. These faint outlines suggest avenues of adaptation of the zoning technique that will be explored in the remaining minutes. Other possibilities may occur to the reader.

Roadside Zoning

Problems stemming from inadequate roadside zoning or from its absence are evident in many rural communities. Merely empowering counties or towns to pass roadside zoning regulations does not assure the adoption of adequate controls. The community, or its neighbor, may decline to zone, or may adopt inadequate regulations. Good roadside zoning too often stops at a political boundary, but the road goes through.

Examples have been cited of some legislative experimentation with roadside zoning, including laws requiring minimum set-back lines, if the community zones; laws directing local governments to adopt regulations; and laws authorizing state agencies to veto roadside ordinances. In 1949,

the legislature of another state seriously considered conferring on its State Highway Department authority to zone areas along certain roads.

Perhaps the State is the appropriate level for imposing roadside zoning, at least on primary highways. Greater uniformity in roadside regulation, both geographically and chronologically, is needed to maintain the traffic carrying capacity of highways, to increase or preserve their safety for travel, and to protect the scenic attractiveness of the landscape. There are numerous examples of new arterials which, after only a few years, become cluttered with ribbon business districts, with a resulting reduction in rate of traffic flow and an increase in traffic hazards. Examples are also common of attrition by local interest causing a gradual breakdown of locally imposed zoning regulations. The larger public interest suffers. A realistic approach calls for administration of roadside zoning at a level more able to resist harmful local pressures.

In 1947, Michigan authorized its cities to eliminate nonconforming uses in residential districts by purchase or condemnation. Similar authority to condemn dangerous nonconforming structures in glide areas is usually conferred by airport zoning enabling laws. An analogous public purpose would be served by the exercise of the power of eminent domain for suppressing dangerous noncomforming uses in roadside zoning districts. Moreover, grants and aids for highway purposes might be predicated on the existence of adequate roadside zoning.

River Basin Developments

Rural zoning is a useful regulatory tool that should not be overlooked when planning river basin developments. No doubt, farm communities in river basins will make increasing use of conventional zoning regulations for guiding their expanding economies. New types of regulations, adaptation of old types to attain new ends, and rural zoning by other levels of government offer possibilities.

Rivers are indifferent to political boundaries, and flow unconcernedly toward the sea. On their way, they may confer multiple benefits or wreak major havoc. Unwise land use on the watershed often accentuates problems in the valleys below. Conversely, remedial measures applied upstream may confer both local and downstream benefits. Problems of river basins call for the integration of remedial programs of all areas. However, the authority of remedial and regulatory agencies often ends at political boundaries.

Programs looking toward stabilization of water supply and reduction of siltation and flood crests must begin on the watershed, with soil stabilization and water retardation on agricultural, grazing, and forest lands. One means of reserving upper watersheds for stream regulatory purposes is by purchase for public forests. Perhaps the same end could be

attained by strengthening forest zoning. Forest zoning might be fortified by regulations at other than local levels or at a combination of levels. Blocking-in of private forest holdings could be aided by allocation of river basin development funds for the purchase or condemnation of nonconforming tracts to be resold for forestry and recreational uses. At the same time, public recreational values should be protected by zoning regulations similar to those found in two Michigan ordinances which require forest land to remain open to public hunting and fishing. The State is justified in exercising firmer control of rural zoning where state and national investment and interest in rehabilitation is large.

Consideration should also be given to flood-plain zoning. Certainly residences should be excluded from areas subject to frequent or serious flooding. Annual flood losses might be greatly reduced by restricting such lowlands to general agricultural uses and the more critical areas to grazing. Exercise of the power of eminent domain might be justified for removing from the flood plain, structures and uses subject to aggravated flood losses. Again, as in flood-source areas, flood-plain zoning regulations, to be most effective, need to be imposed at a level of government higher than the local level. Maximization of benefits from flood-plain zoning calls for restrictions on land use in all areas subject to periodic damaging inundation, irrespective of local political boundaries. Benefit-cost analysis might be used in making a choice between flood-plain zoning and alternative remedial measures. Such analysis would also be helpful in determining the character of flood-plain zoning regulations to be adopted.

Agricultural Districts

The full potential of the rural zoning technique for protecting the agricultural community and for guiding its growth has not been realized. Frequently the public interest would be better served by preventing unplanned, haphazard, premature suburban development on good agricultural lands. The destruction of the agricultural character of rural communities on the urban fringe often begins by sale of a few small tracts for residential uses. Such parcellation and nonfarm uses are permitted by prevailing farm zoning district regulations. The process continues, bringing with it school and sanitation problems, higher taxes, and, finally, economic and political submergence of the rural community. Perhaps zoning regulations could be designed to prevent such changes until the area is "ripe" for suburbanization. For example, prohibition of nonfarm residences in agricultural zones and the imposition of large-tract minimums would tend to retard parcellation. In other words, use regulations pertaining to agricultural zones might be of a noncumulative character and exclude rather than admit all uses allowed in more restrictive zones. This is a growing practice in industrial zoning districts. Furthermore,

statutes prescribing five-acre minimums in residential-agricultural zones are not infrequent. A Colorado ordinance imposes a minimum of 20 acres for each dwelling unit.

By adequate zoning and related measures, suburban expansion in many communities could no doubt be directed toward the less fertile agricultural lands. The national interest is served by maintaining the food producing capacity of our soils. We are doing something about soil erosion. Perhaps tomorrow we may find a way to keep the better soils on the expanding urban fringe producing food.

Zoning in Defense Areas

During World War II, rural zoning gave public direction to mushrooming urbanization near newly established or enlarged military installations. The Nation is again mobilizing its resources for defense. Existing military facilities are being reactivated and new facilities established. Industries are being decentralized, and frequently are located in rural towns or in the open countryside. Again the National Defense effort can be materially assisted by zoning direction of the growth of these changing rural communities.

Two statutes pertaining to zoning in defense areas deserve special mention. In 1941, Nebraska created a state zoning agency to coordinate zoning activities in defense areas. The agency was empowered to group cities, villages, counties, or portions thereof, into state zoning districts, whenever a military reservation was, or was about to be, located in such areas. Under this zoning defense law, which is still in effect, the original zoning plan is prepared by the agency and submitted to the local units of government. They may approve the plan as submitted, or may, before adoption, change the zoning plan pertaining to areas under their respective jurisdictions.

The second act referred to was enacted by North Carolina in 1949, and conferred zoning powers upon the Cherry Point Marine Corps Air Station Zoning Commission. The zoning area involved is located in two adjoining counties. The respective county boards are authorized to appoint two members of the zoning commission, and the fifth member is appointed by the commanding officer of the air base. Both planning and legislative powers are granted to the zoning commission. Perhaps this latter act foreshadows coming regional zoning agencies.

Conclusion

In closing, I want to leave a warning and a reminder. Consequential decisions are often made by omission. The character and future development of a rural community, particularly on the changing urban fringe, may be as greatly affected by legislative inaction as by legislative action.

Evolving land-use problems in a dynamic rural economy call for affirmative guidance by the community. Only slight protection to its agricultural values is offered by the now frequent provisions in state rural zoning enabling laws, exempting agricultural activities from zoning regulations. The tide of change moves by unguided, where decisions vital to the welfare of the rural community are made by inaction—by doing nothing.

Also, again I want to stress that the legal raw materials of zoning—the various types of zoning regulations—were urban-created; that pioneers in the field of rural zoning took these basic raw materials and by adaptation shaped them to serve the rural community, both on the urban fringe and in the open country. Today's new rural problems and goals call for new zoning techniques. As in the past, so in the future, rural zoning will no doubt prove to be a flexible community tool. We may look for further experimentation with rural zoning enabling legislation by state legislatures. We may also look for additional adaptations and innovations in the use of the zoning technique. Rural zoning is still in its youth—its full potentials have not been tapped.

LAND CLASSIFICATION IN THE PRAIRIE PROVINCES

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LAND classification in western Canada has been concentrated in the plains areas of the Prairie Provinces. This area comprises the northern extension of the Great American Plains and reaches from the Red River Valley on the east to the Rocky Mountains on the west, and northward in a triangular shape to a point some 300 miles north of the 49th parallel and not far from the third meridian, which marks the boundary between the provinces of Saskatchewan and Alberta.

The physiography of the whole area, except where it merges into the mountains in the west, is characteristic of continental plains. At the outer fringe of the Open Plains the native vegetation begins to change from the dominant grass of the prairie areas to the willow and aspen groves of the forest fringe. The transition from grass to woodland forms a fairly wide belt around the Open Plains and is characterized by the black soils which cover the greater part of southern Manitoba, eastern, north central, and northwestern Saskatchewan, and eastern, north central, and western Alberta. Beyond this black soil belt is the transition of the black or parkland soils into the podzols, the lower fringe of which in general marks the frontier of present settlement.

The brown soils characteristic of the Open Plains gradually become darker toward the edge of the parkland belt comprising the black soils. Roughly one half of the presently occupied area of the three Prairie Provinces is within the brown soil zones, although less than one quarter of the population dwells therein.

The climate of the Prairie Provinces is continental in nature because of their inland position. The extremes of heat and low precipitation tend to occur near the centre of the general area, coinciding with the south-central portions of the Provinces of Saskatchewan and Alberta. This inland position largely dictates the economy of the region, because the markets for most of the prairie products, as well as the centres producing the manufactured needs of the area, are situated at a considerable distance from these provinces.

The establishment of agriculture in these areas was relatively rapid. The Open Plains were readily brought under cultivation, and wheat early became the most important crop. It was the one best adapted to the greater part of the region and enjoyed a ready, though distant, market. The wheat economy thus established has continued to dominate the economy of the Open Plains, and is only of little less importance to that of the Prairie Provinces as a whole. The establishment of this wheat economy took place largely from 1900 to 1930. The rapid agricultural

settlement and cultivation which marked that period was encouraged by national immigration policies, the Homestead Act, and the efforts of certain nongovernment organizations interested in land development and population.

In view of the rapidity of this settlement over such a wide expanse of territory of untried use, the failures were few compared with the achievements; nevertheless, failures of far-reaching magnitude occurred. The effects of these were cumulative and were multiplied by the prolonged drouth of the thirties. Certain of these failures that did occur may be attributed to some extent to the apparent wrong use of land in parts of the Open Plains. This may be observed in the almost total abandonment for cultivation of fairly extensive areas in southeast Alberta and southwest Saskatchewan. These lie within the central part of the Open Plains, where the incidence of heat and low precipitation is greatest.

In general, less abandonment for cultivation took place outside the central part, and was chiefly associated with inferior lands. Abandonment was not total in all cases; although it probably was for one settler, another, after a return of more favourable moisture conditions, attempted to farm where the first had failed. If he had other lands and sufficient capital, he probably was able to hold on to it and continued to farm it; if not, he probably would have had to give the job up as had his predecessor. Such adjustments took place with considerable hardships on the part of the individual settlers concerned and at much expense to the public bodies responsible for the welfare of these people.

The instability thus created called for periodic government assistance, which in turn led to a demand for a more permanent solution. The passing of the Prairie Farm Rehabilitation Act in 1935 by the Federal Parliament, and setting-up machinery to administer the act, may be regarded as an acknowledgment by the Federal Government of some of the difficulties that arose from their original settlement policies. One of the agencies called upon to assist the P.F.R.A. was the Economics Division of the Federal Department of Agriculture which, in cooperation with the farm economics branches of the universities of the Prairie Provinces, undertook studies of economic and social problems associated with the use of the prairie land.

To give such studies a more practical turn for the use of the administrators, whom the cooperating agencies were called upon to serve, an economic classification of the land in the Open Plains region was commenced in 1936.

Provincial authorities in Saskatchewan and Alberta, who were responsible under land utilization legislation for retiring from cultivation lands unsuited to that use, and federal authorities responsible for carrying out provisions related to land use in the Rehabilitation Act, asked specifically,

"What lands should be so retired from cultivation?" In the economic sense, what lands were submarginal, marginal, and better than marginal? These terms were bandied about with as many different connotations as the number of people who used them. During the early thirties the incidence of drouth and low prices struck most severely on the Plains Region. There were severe soil drifting, grasshoppers, and crop failures even where the land was most fertile. There was almost universal relief assistance for production as well as living subsistence, but not enough to allow for proper fallowing and other cultural practices, and the machinery then in existence was almost worn out. Under these conditions, some of even the most productive land was submarginal in the economic sense.

Thus was the need of orientating our objectives in respect to the use of land on the Open Plains to bring the whole problem into its proper perspective. Fortunately in Saskatchewan, where the problem was most acute and widespread, there was a background of information on farm production, etc., which had been systematically gathered by an active statistics branch in the Department of Agriculture for some 15 years previously. There was a fairly detailed reconnaissance soil mapping completed for the whole open plains country; this had been begun 12 years before. And, last but not least, a series of farm management and business studies had been begun about 10 years before by the late William Allen, which had covered many parts of the Open Plains and which had emphasized not only farm organization, but land use, yields, indebtedness, and financial progress.

Drawing on this background of information, the first task was to determine and to define what constituted marginal land on the open plains of Saskatchewan and to orientate other kinds of land differing in productivity around it. Reference has already been made to the importance of wheat in the economy of the Open Plains of western Canada. About 45 percent of the cultivated land was in wheat. It has held at that for more than a quarter of a century, except for a few years during the early forties when farmers were paid not to grow wheat, under the Wheat Acreage Reduction plan. Fallowing occupies more than a third of the cultivated acreage, with other grains, in a minor position as users of land, usually based more on rotational requirements than upon their competitive position in relation to wheat. More than three quarters of the gross farm income of the Open Plains is derived from wheat. Wheat is the most profitable use of the land, hence marginal and other classes of land were determined on that use and defined in that relationship.

Marginal land in wheat production was defined as land which because of its location, character and record of production, operation with average managerial ability, in a unit of average size and typical organiza-

tion, would be expected to pay expenses—including depreciation and taxes—and would provide a living for the operator and his family; but above these, would not provide a surplus to pay for the use of land either as rent or interest.

Farm business studies in south central Saskatchewan prior to 1936 had indicated that the average size of farm in the area was three quarter-sections, or 480 acres. The same studies indicated that in order to meet the expenses enumerated above, these farms would have to produce between 1,050 and 1,425 bushels of wheat for sale annually. This was in addition to the income received from minor sources such as livestock, livestock products and so forth, of the kinds and amounts usually found on these farms. The lower limit of the range for marginal land, 1,050 bushels of wheat available for sale, was premised on the operator's accepting the equivalent of hired man's wages as remuneration for his labour and management, a condition felt to be the least acceptable to him to assure continuation of the cultivation of the land. The upper limit, 1,425 bushels, allowed a remuneration to the operator equivalent to the average living costs of farm families in the region. Farm living costs, receipts from farm products, costs of farm operation, and hired man's wages were computed on a long time price level basis.

While a farm unit of the average size in the area was used in determining what constituted marginal land for wheat production, the unit of classification was the quarter-section of land. It is recognized that the "farm is the unit of use," but in using it as a unit of classification there are practical difficulties. A farm may contain three quarter-sections this year, and in five years hence include two quarters from an adjoining farm; and one of its original quarters may even be sold to form a part of another farm. The farm boundaries are by no means permanent. In western Canada the quarter-section survey fixes the unit for legal description, original free grant of land, taxation purposes, and so forth, and it is rarely divided by sale for agricultural purposes. It is permanent. Because of this, the quarter-section has been used as the unit in the economic classification of the land in the Open Plains Region of western Canada. Hence, on a quarter-section basis, marginal land for wheat production in south central Saskatchewan ranged from 350 to 475 bushels of wheat available for sale on an average annually, or one third of the total available for sale from a farm of average size. As a first approach in the classification, quarters whose potential productive capacity came within that range were considered marginal for wheat production and designated Land Class II.

Within a like farm organization, quarter-sections not capable of producing more than 350 bushels of wheat available for sale were considered submarginal in wheat production and designated Land Class I. On the

other hand, parcels capable of producing more than 475 bushels of wheat available for sale were considered supramarginal. This implied that a surplus could be earned above operating, capital maintenance, and operator's remuneration to pay on use of land. Land Classes III, IV, and V comprise the supramarginal land, accommodating respectively the better wheat growing lands—Land Class V identifying the most desirable parcels in this use.

Land classified as submarginal for wheat production does not preclude its being supramarginal in some other use. The alternative use on the Open Plains is grazing. In grazing, fewer production factors, other than land, are required than in the more intensive use for wheat growing; hence, some payments for use of land may be forthcoming. Land classified as supramarginal for wheat indicates that there is a surplus above the costs of factors other than land in its production, which can properly be used in payment for use of land.

Now you will recognize that in establishing the basis of this classification a number of assumptions were made, upon the soundness of which depends the validity of the classification. I shall refer to these, but before doing so, it may be well to outline the mechanics of the classification a little further.

Since the basis of classification was essentially the productivity of individual quarter-section parcels, the technique of classification consisted of establishing for these parcels the potential out-turn of wheat. For individual parcels this out-turn was the product of the annual yield and arable acreage. Soil type and wheat yields were made the criteria for estimating the physical productivity of parcels to be classified. Field survey procedures were developed to obtain the best possible records of wheat yields for the main soil types in the area. For each type of soil these records were then averaged to determine long-run yield expectancy as related to past experience. The determination of arable acreage for each parcel was made by field inspection aided by aerial photographs and plats of land valuators of Provincial Land Assessment Commission.

Knowledge of soil type and arable acreage for a particular parcel permitted an estimate of productivity and a tentative placing of the parcel in one of the five land classes. Within soil types, however, the estimates of yield levels on individual parcels showed considerable variability. These were due to differences in physical characteristics, such as topography, stoniness, and extent of erosion, and also to local differences in climate. In addition to producing lower yields, these undesirable soil phases were also more difficult and costly to cultivate. In finally determining land class, it was therefore necessary to construct, for each parcel, a productivity rating which took these factors into account. The average yield for the soil type was first adjusted according to the condi-

tion of the individual parcel and then combined with the total arable acreage of the parcel to give a final estimate of productivity. The final rating could thus be either higher or lower than the preliminary estimate based upon average yield alone. The results of the classification were then verified by observation in the field, particularly to review borderline cases.

The ranges in bushels of wheat for the respective classes as given were established for south central Sasketchewan. In the classification of western Saskatchewan, and eastern and southern Alberta, cognizance was taken of the somewhat higher freight rates which prevail in those regions by reason of longer haul to market, with consequently slightly higher farming costs. The ranges in bushels of wheat for equivalent land were shifted upward to make the incomes comparable.

By way of summary, the land classification described has consisted of rating quarter-sections according to their capacity to produce revenue from wheat in relation to costs. The critical class, Land Class II, marginal for wheat, was established in reference to an average size farm made up of parcels of land of such characteristics that would yield only sufficient revenue to pay the operating costs, capital maintenance and remuneration to operator, and hence no surplus to pay for the use of the land. In the composition of such a farm a "norm" was assumed, not only for size, but also for type, management, and costs of operation. Furthermore, past conditions of yield and prices were assumed to prevail in the future. Thus, the conditioning factors establishing the classification have been made static, and the weakness of this in a dynamic economy need not be enlarged upon to this group. Without conditioning factors, however, one can hardly contemplate a land classification arrived at in more or less objective manner, and this necessarily confines its usefulness to a specific purpose and for a limited time.

Up to the present the classification has continued to serve the purpose for which it was created. That was to indicate to those who are called upon to administer land policies in the Open Plains Region those parcels which are better utilized by grazing and those which can be more profitably utilized in wheat production, and a relative grading in this use. Though the utility of the classification up to the present time has been limited by reason of the time required to cover the Open Plains country in the classification, nevertheless it has performed and is performing still a useful function. The classification served as a basis of establishing most of the community pastures in the open plains of Saskatchewan. It has given guidance to the Saskatchewan Land Utilization Board. It is used by land use and conservation administrative bodies in both provinces. The economic classification of the lands in the Special Areas of Alberta was adopted by the Administration of those areas as soon as it was made available.

It is nearly 15 years since the original concept of marginality in an average sized farm within the Open Plains Region of the Prairie Provinces was established. Since then, wheat farms have increased in size and have become more mechanized. What has been the effect? Has the land added to the marginal farm in wheat production a decade ago and increased mechanization raised the unit above a marginal one? Studies carried out with a view of testing this in western Saskatchewan as late as 1947 do not indicate that the changes in average size and extent of mechanization have raised the unit above a marginal one, when receipts and costs are adjusted to long time averages. The increased mechanization has brought about increased costs in both the overhead and operation of the average sized unit, comprised of Land Class II land, in relation to the gross returns. Other costs, such as those associated with the content of family living requirements and used as the remuneration to the operator, have increased also. These appear to have absorbed the revenue from the additional land. The study to which I have referred showed the average size farm of 1947 in Land Class II to be a little less than a section as compared with the three quarters of the original budget. About 46 percent of the cropland was in wheat, and there was more fallow than in the original set-up.

While we do not suggest that the tenets of the classification structure in our concept of marginality of land in the Open Plains of the Prairie Provinces will hold indefinitely, we do feel, as evidenced by the recent study to which I have referred, that changes which have so far taken place in farming on the Open Plains have not seriously disturbed the classification structures. With some 32 million acres of land thus classified in Saskatchewan, practically all the open plains have been covered. In Alberta 10 million acres have been completed. There is still about half of the Open Plains to be covered in Alberta.

From the early part of this paper, which was intended to give the setting of the Open Plains in relation to the rest of the settled regions of the Prairie Provinces, it will be recognized that the extension of land classification will encounter new conditions which will require modifications of present procedures. The program has established, however, the general principle of classification based upon the criterion of income expectancy. On the Open Plains, income expectancy is very closely related to suitability for wheat, whereas in the park and wooded areas specialized wheat production gives way to a more diversified type of agriculture. Oats in some areas, notably the Peace River Block, and barley in others, notably northeast Saskatchewan and western Alberta, compete more successfully with wheat than they do on the Open Plains. There is less fallow. The acreage of forage crops—legumes and grasses (chiefly brome)—though as yet of minor importance, is increasing. In these areas income

expectancy will have to be measured in one or possibly two other uses as well as wheat, and no doubt other modifications will have to be made in the techniques of classification hitherto employed, if the classification is to be extended into those areas.

DISCUSSION

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Mr. Hill asked me to discuss Dr. Spence's and Dr. Haase's paper, and, if I wished, Mr. Solberg's also. Since I am not a student of zoning, I am not qualified to say much about Mr. Solberg's paper. It seems to me that he has given us a very good review of the practices, problems, and potentialities of rural zoning.

I have one point to make concerning the relation of rural zoning to land classification which Mr. Solberg omitted. This is no criticism of his paper; he couldn't cover everything. If a rural zoning ordinance is to be more than a capricious instrument, subject to modification simply to suit influential individuals who want changes for their own advantage, it should be supported by some kind of land classification disclosing the potentialities of the land for different uses. Lacking this, the best interest of the public may be more difficult to defend against the claims of those seeking to shape an ordinance to suit their ends.

Dr. Spence has described to us a land classification procedure with a limited objective. Having a limited objective, and therefore one that can be fairly clearly defined, it has been possible to design a procedure that gives some assurance that the objective will be served.

It is usually difficult to discuss the subject of land classification because the term means one thing to one person and something quite different to another. There are, on the one hand, economic land classifications that deal with operating units or with cadastral units that normally combine to make up operating units, as the units of classification. The classification described by Dr. Spence is of this sort. There are also land classifications in which naturally bounded areas, for example soil types or physical land types, are the units of classification. Some clarification of nomenclature in this field would be beneficial. Dr. Charles E. Kellogg, Head of the Division of Soil Survey in the United States Department of Agriculture, has proposed that the term "land classification" be limited to those classifications dealing with land in the economic sense, and with cadastral or operating units. Classifications dealing with land in the physical sense and with naturally bounded areas he would call "soil classification." He is thinking here, of course, of a soil as a geographically bounded area having a distinguishing bundle of physical, chemical, and biological characteristics.

Generally speaking, two circumstances impel us to undertake land classification. One is having an imminent problem that compels us to classify land. Sometimes we have to take some action that requires us to discriminate between one kind of land and another, and so we are compelled to classify land to exercise our choice. An example is the planning of an irrigation project. Not all lands responds equally well to irrigation, so we must classify areas according to their expected productivity when irrigated. I believe Dr. Spence's classifica-

tion is another example of a land classification undertaken because of a rather imminent problem requiring it.

On the other hand, some land classification efforts arise from a belief in the need for a multiple-purpose land classification—one that will guide various individuals and activities in the future, by disclosing something of the land's potentialities. Usually it is much more difficult to design such a multiple-purpose land classification. The objectives are usually not so sharply defined as when we work to meet an imminent, definite problem. If the procedure is designed to meet one objective well, it is likely to serve the others less adequately.

Dr. Spence does not pretend that the classification he describes discloses more than the potential income expectancy of the land when used in wheat farms of average size—namely, about three-quarters of a section, and under assumed price-cost relationships. He would be the first to admit, I am sure, that other classifications using other lines of evidence would be required to disclose potentialities of alternative types and sizes of farms.

A three-quarter section or even a full section wheat farm is not a very large wheat farm for the drier parts of the Prairie Provinces. One wonders what the classification would look like and where the margin would fall if one assumed the land to be used in large wheat farms, say of two or three sections.

It seems to me that this work has involved judicious use of evidence of income expectancy in arriving at a classification. In economic land classification that is what one is bound to use. But where do we get evidence of income expectancy? In the United States, we do not have farm business records or crop yield records for more than a small fraction of the land that might need to be classified. I am sure the same must be true in Canada. How do we get evidence for the intervening area?

Dr. Spence has told us one way, and I believe it is the best way; and that is to use soil type as a means of extending crop yield or other production expectancy data. But this requires that we have mapped soil types with sufficient accuracy that soil areas of considerable uniformity are shown. Otherwise, we cannot depend on production records from one part of a soil type being applicable to the whole extent of the type. Dr. Spence indicates that some trouble was experienced in using soil types to extend data in this way. Adjustments had to be made to take account of differences within a soil type, This suggests that the soil maps were too generalized, and a given type had too great a range or variation in characteristics for best use in extending production data. I doubt that we could afford to make soil maps in the detail required, merely to extend data as evidence for land classification. However, this is only one of many uses of soil maps. They are also the means by which we extend research results from experimental plot or field to the area of like characteristics where they are presumed to be applicable. They are the device by which we sort out and classify a great body of agricultural experience, so as to know where particular practices, crops, and varieties fit, and where they do not.

The importance of the soil map accompanied by yield experience data for each soil type becomes more apparent when economic land classifications of the sort described by Dr. Spence are undertaken in areas where there are numerous alternative crops and enterprises, and not merely one or two as in the area covered by the land classification he described. For it is quite obvious that yield records for all the possible alternative crops will not be available for all the fields and farms one might wish to classify. Some way must be devised

of predicting what production is likely, in the absence of any direct record of experience on the parcel in question. Only by extending the data of experience from soils of like character can such predictions be supported by evidence.

The existence of accurate soil maps to which yield data can be related will permit making or revising a classification of this kind, without each time finding a new basis for expanding yield data to areas to be classified.

Finally, I believe there is no reason why the general techniques employed in the classification described by Dr. Spence cannot be used in areas of more diversified farming, using budget analyses to appraise prospective opportunities from different sizes and organizations of farms. However, one suspects that it is not necessary to undertake such land classification everywhere, but rather that they should be essayed at times and in places where a clear-cut problem requires them, as was apparently the case in the area described by Drs. Spence and Haase.

DISCUSSION

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Land classification can take a variety of forms; as carried out on the Canadian prairies it is a technique designed to measure the net value productivity of a parcel of land. The method involves setting up a farm budget for a given acreage of land on each soil type. Allowance is made for the cost of all inputs except land. The size of the net product is then used as an indicator of land quality.

There are a few comments with respect to the techniques of land classification which I wish to make. These concern the procedure required to handle two of the determinants of the net productivity of land, namely, (1) the product produced and (2) the amount and kind of cooperating factors.

The first raises almost insuperable problems of calculation. In order to classify land, one should calculate the net value product for every likely crop and crop combination. In the case of many farming areas, the testing for this would be an impossible task because of the variety of products which compete for the land.

In the area of western Canada where land classification has been carried on, it has been possible largely to abstract from this problem. It was possible to select one crop, wheat, and proceed to calculate the net value productivity of land for that one use. This could be done, in spite of the fact that wheat is only one of several small grain crops which compete for the land. Cultural methods and cost-price relationships are sufficiently similar within that group of products that determining the net productivity of land for one of them determines what it is for all of them. At the same time, the other use which competes for that land, namely, grazing, involves such low efficiency and capacity for input on the part of land that competition with wheat does not appear until the net productivity when used in wheat production gets very low. Therefore, the area provides a unique situation in which competing products can be disregarded. It is doubtful if another area with this unique characteristic could be found in Canada.

Under (2) is the problem of the relationship of net productivity to the amount of cooperating factors. In setting up the budgets the land area per farm was

held at a three-quarter section for all soil types. The error that creeps in there is that one soil type represents more soil resource than the same number of acres on another soil type, so a combination of the factors of production which is optimum for one soil type is not necessarily optimum for another. Therefore, differences in net productivity which are found by this method are partly due to the quality of the land resource, and partly due to the fact that one combination of the factors of production has been superimposed on all soil types. The net result of this method is to distort the rating of parcels of land to which the assumed farm organization does not fit.

Apart from techniques, there is the question of the contribution that land classification can make towards the land use problem. The program of land classification in western Canada was prompted by considerations of (1) welfare and (2) efficiency.

On the welfare side, it had been observed that farmers on "poor" land (i.e., land with low moisture-holding capacity) had lower incomes and levels of living than those who farmed on "good" land. On the efficiency side, it was clear that some land now cultivated could best be used for grazing. Yield and price uncertainty made the problem exceedingly complex. The process of land classification by emphasizing long-run average yields, prices, and costs presumably should contribute (1) to production efficiency, by sharpening the line of demarcation between the two major land uses and (2) to welfare, by providing more exact information as to the long-run net income potential.

I feel, though, that the approach to the problems of labor income and production efficiency on farms via land classification falls somewhat short of what is required.

There is no reason why farm labor income should not be as high on one soil type as another, provided that farms produce the crops and are organized in a way for which the land is best suited economically. But on "poor" land the main contributor to low net incomes is the fact that the ratio of labor to the land resource is higher than on "good" land.

One of the reasons for this is lack of information concerning the best farm organizations for various soil types. But often the reason is that too many people try to earn a living from the "poor" land. The original system of land distribution via homesteads contributed to that situation. A one-quarter section homestead grant represented highly different amounts of soil capital in the various soil types. Those who acquired the heavy clay soils obtained a good deal more land capital than those who acquired the light loams. The result was that the farmers on heavy soil were able to accumulate capital which further enhanced their labor efficiency and income. Further, it enabled the sons of those farmers to seek outside employment and relieved the demand for land in the second generation. The tendency has been, therefore, toward a higher ratio of labor to soil capital on the poorer lands.

What is really needed, then, is a thorough study of the way to reduce the high man-to-capital ratio in those problem areas. It is a question of suitable farm organizations and of the mobility of capital and labor. It may be necessary to find other employment for many people in those areas, or it may mean extended additions to the capital stock (e.g., irrigation developments) to reduce the man-to-capital ratio. The point I wish to make is that the labor income and the efficiency problem in agriculture can both be solved only by giving consideration to reorganization of the factors of production. The usefulness of land classification in assisting with this problem is severely limited by the fact

that only one factor combination for each soil type is taken into consideration.

Rural zoning is an extension of land classification so as to give it legal sanction. Urban zoning is accepted practice, and as Mr. Solberg has pointed out, zoning is needed badly in some rural areas.

The growth of some of our cities has been rapid over the past 10 years, and as people seek dwellings beyond the city limits certain problems arise. My observations from developments in the Vancouver area are that there are two main categories of problems: (1) to keep the development orderly and (2) to equalize the cost of the additional community services required.

Unless orderly development is forced by zoning regulations, the extension of dwellings into the farm areas involves cutting pieces out of operating farms. The owner finds it worth-while to sell an acre to a wage earner rather than farm it. When this reaches sizable proportions, it creates real problems in sewage disposal, water supply, and transportation, not to mention the effect on farm efficiency of cutting parts out of fields.

The other problem involves zoning so that people are called upon to pay somewhat in keeping with the services they require from the local government. It should be done so as to make taxation consistent with the services required by the small land holders. The costs for education, water supply, sewage disposal, and other services rise somewhat in proportion to the number of people who move in. Yet methods of assessment and taxation are often not flexible enough to allocate the costs of these to the new nonfarm residents. The development, therefore, can become relatively costly to the farm sector of the municipality.

These two problems are not too difficult to guard against. I would say that the greatest problem is in getting local governments to act before haphazard developments take place that are costly to correct, and before one sector of the community has paid an unfair portion of costs.

AGRICULTURAL STATISTICS

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SAMPLING FOR AGRICULTURAL STATISTICS IN CANADA

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CANADA'S official agricultural statistics are the responsibility of the Dominion Bureau of Statistics. Within the Bureau, the Census Division is concerned with the decennial and quinquennial Census of Agriculture, while the Agriculture Division has responsibility for intercensal statistics pertaining to agriculture, including both primary and secondary data. A later paper today on organization will indicate the Federal-Provincial cooperation in this field, also the part taken by the Department of Agriculture and other government and private agencies. This paper will deal, for the most part descriptively, with those official intercensal statistics derived basically from samples. The scope of such statistics, the sampling and estimating techniques employed, and some plans for the future will be discussed.

The practical distinction between a sample and a census is well known. A census, of course, implies a count of all units within a defined population of units to obtain a desired description of that population. A sample, in contrast, involves a count of only some of the units within the population, usually a small portion of the units, the description of the whole being inferred from the part by established techniques. An error, termed sampling error, is introduced by observing only a part of the population, but the money and time costs avoided by sampling are usually well worth the possible loss in precision of the estimate derived by sampling. There are other errors, collectively called non-sampling errors, which are common to both censuses and samples, and it is the total error of a statistic which should concern the producer and user of the statistic. Statistics are not always less precise when obtained from a sample instead of a census.

Two types of samples may be distinguished—probability samples and, for lack of a better term, non-probability samples. Probability samples are chosen in such a way that an element of random selection is attained. Such samples yield statistics having a determinate probability of precision, with the precision controllable. Non-probability samples, in contrast, lack the random element and the precision of statistics derived from them is not determinate. The non-probability sample has, however, certain advantages, viz., a saving in money and time costs, relative to the

probability samples, particularly when the information desired is of wide scope and is to be obtained at frequent intervals. It is this feature which renders this type of sample so appropriate as a base for official intercensal agricultural statistics in Canada and in other countries, including the United States.

Official agricultural statistics in Canada respecting economic conditions at the farm level are, almost without exception, based on non-probability samples of the voluntary mail questionnaire type. As the term implies, prepared questionnaires are distributed by mail to farmers who voluntarily answer the questions and return the completed questionnaire, again by mail. It is the farmer who determines whether his observation will or will not be part of the sample, and therefore the random element is missing from the sample. The samples are usually selective because of this, and interpretation of the sample results involves techniques of bias control and adjustment.

The scope of statistics based on voluntary mail samples in Canada may be indicated by reference to specific surveys. The June and December Surveys of Crops and Livestock constitute the two major semi-annual surveys. Both surveys ask for information about the farmer's own farm and an attempt is made to place a questionnaire in the hands of every farmer in Canada. Seventy to eighty thousand farmers across Canada reply on each of these surveys. The June Survey asks for acreages sown or to be sown to individual crops, inventories, production and disposition of livestock on farms, inventories of poultry, number of laborers on the farm at June 1, and bushels of wheat fed to livestock and poultry during the crop year. The December Survey requests information on farm inventories, production and disposition of livestock, inventories of poultry, total wages paid during the calendar year, laborers on the farm at December 1, and data on abandonment or diversion of acreages for four principal crops.

Selected lists of approximately 10,000 farmer and 3,000 non-farmer crop correspondents report monthly during the growing season respecting acreage intentions, condition and yields of crops, stocks of grain on the farm, grain fed on the farm, the progress and rate of seeding, winter-kill, threshing dates and fall ploughing. The correspondents are chosen so as to provide geographic representation, and almost a 60 percent return is secured on these surveys. Data on acreage and production of vegetables are sampled from 5,000 producer correspondents. The number of bee colonies and honey production are obtained periodically from special lists of nearly 30,000 registered beekeepers, of whom some are active and some non-active producers in a given year. The production of maple syrup and maple sugar is estimated from the returns of about 10 percent of the 11,000 producers listed.

The monthly Poultry Survey utilizes lists of poultry producers in securing estimates of egg production and poultry-meat production and disposition, while periodic surveys of turkeys, geese, and ducks complete the poultry picture. Until very recently poultry correspondents numbered 2,100, of whom nearly 60 percent replied regularly. The size of the turkey lists and returns are similar. Currently the poultry list is double this number and further enlargement is anticipated. The monthly Dairy Correspondents' Survey seeks information respecting milk production and farm utilization of milk from 5,500 farmers keeping milk cows. Over an 80 percent return is received. The annual Shorn Wool Survey and the Anticipated Fur Pelt Production Survey round out the livestock situation at the farm level.

Farm prices are sampled monthly for a selected list of farm products, and the 3,600 price correspondents report three times a year on wage rates for hired help. On the average, two thirds of the correspondents report each month.

A market-area sample of fluid milk and cream sales is collected monthly from distributors and producer-distributors. About 180 markets are covered by this survey, involving over 2,000 respondents. In general, however, statistics pertaining to processed farm products are not obtained by sampling. In principle, where the number of reporters in the population or universe is relatively small, a census of such reporters is usually undertaken.

Before discussion of the techniques employed in Canada in estimating from voluntary mail samples, there are some principles which may be worth-while emphasizing. For any type of sample, two components of the desired estimate are usually required, viz., a sample indication from the sample and an expansion factor. For example, to estimate acreage in wheat, one might use as the sample indication the average acreage per farm, and as the expansion factor the number of farms in the population. The expansion factor itself may be, and often is, an estimate from an independent sample. For a voluntary mail sample, the critical feature is the likely bias in the sample indication obtained from it. An adjustment for bias is, therefore, usually essential and this adjustment may be approached in several ways.

One method of adjustment is the construction of a ratio statistic using two similarly biased statistics from the sample, the bias of each statistic counteracting the other in the ratio. For example, the average acreage per farm in wheat may be positively biased by inclusion of too many large farms, but in this case the average farm area in the sample will also be biased in the same direction. The ratio of wheat acreage to total farm acreage in the sample will therefore be a less biased statistic than either of its components.

Another adjustment method is particularly applicable where a series of estimates is derived from surveys which are recurring over time, as is the case with virtually all sample surveys for official agricultural statistics. If reliable check data are available, such as may be provided by censuses or properly designed probability samples, the bias in the sample indication may be satisfactorily approximated and an adjustment factor computed. While this kind of check data may not be available currently, it can be used historically for adjustment, and the assumption of consistent bias in recurring surveys permits the use of the adjustment factor currently. There are many variations in the use of this method of bias adjustment, but it probably has been brought to peak effectiveness in the regression method of interpreting sample indications as developed and currently used by the United States Bureau of Agricultural Economics. The key factor in the practical application of the principle is the assumption of consistent bias in recurring surveys.

In Canada, the assumption of consistent bias has always been a questionable one because of difficulties connected with the establishment and maintenance of effective mailing lists. Considerable progress has been made in solving these problems within recent years, and the above method of bias adjustment has been used to obtain valuable checks against estimates derived from the familiar identical farm samples.

Indications from identical farm samples are currently the backbone of Canada's sampling and estimating procedures for official agricultural statistics, although these are supplemented by other sample indications. Reports received currently from farmers are paired with reports previously received from the same farmers. The set of paired reports constitutes the identical farm sample. Since 1933, official statistics of acreages, and farm inventories, production and disposition of livestock, have been based primarily upon indications from identical farm samples. Currently, the June reports are paired to obtain the annual changes in acreages, whereas a June-December and December-June pairing is used to provide indications of change in the livestock population for each six-month period. The monthly poultry survey and the monthly dairy correspondents survey are currently yielding identical or, as we call them, paired farm sample indications of changes from month to month. In almost every case where an expansion factor is an integral part of the estimate, official agricultural statistics are primarily based on a paired farm indication of change. For estimates such as crop yield per acre or price per unit, of course, the total sample rather than a paired sample is used to derive the sample indication which is the estimate desired.

The use of a measure of change for estimating purposes obviously requires as an expansion factor an official estimate for the preceding period or time from which the change is measured. Given the preceding

population estimate, the sample indication of change is applied to it in order to compute the current or desired estimate. This implies a starting point, and the starting point for official agricultural statistics in Canada is the Census of Agriculture. The Census of Agriculture is taken every five years in the Prairie Provinces and every 10 years in the rest of Canada, in the years ending in one, i.e., '31, '41, '51, etc., for all Canada, and in addition 1926, '36, '46, etc., in the three Prairie Provinces. The census data on producing units, i.e., acreages and livestock and poultry numbers on farms, have been accepted, almost without exception. The acceptance has been occasioned by lack of objective evidence to the contrary and by the desire to avoid two conflicting sets of data in census years. As mentioned earlier, however, a census is subject to real non-sampling errors and the assumption of inviolateness is, of course, a practical rather than a theoretical matter.

Thus, for each five-year period in the three Prairie Provinces and for each 10-year period in the rest of Canada, we have a beginning and an ending bench-mark. The original series of intercensal estimates carried forward from the beginning census bench-mark does not necessarily agree with the ending census bench-mark for many reasons, but principally because of the bias which exists in the voluntary mail samples which form the basis of the intercensal series. Therefore, it has been necessary to revise the intercensal series periodically in such a way that the beginning and ending bench-marks be an integral part of the long-time series. These intercensal revisions have been made by the so-called straight-line-trend method, which assumes that the cause of discrepancy between the sample estimate and the ending census bench-mark is constant cumulative bias. We are casting a skeptical eye at this assumption in our revision procedure.

The census data for 1951 will be coming available within the next year, and Canada's official agricultural statistics for the period 1941-51 will likely be subject to revision in the light of the census figures. Whether the necessary revisions will be significant remains to be seen. A significant revision in this context may be defined as a revision of sufficient magnitude to cause a user of statistics to alter his statistically based judgement of policy matters or to have changed the decisions which were made on the basis of official statistics.

While the identical farm change-indications have been the principal basis of official agricultural statistics since 1933, other sample indications have been used since 1946 as check indications. In our regular monthly surveys, e.g., the Dairy Correspondents' Survey of milk production and farm utilization, the proportion of voluntarily returned questionnaires which can be paired with previous returns is very high—in the neighborhood of 90 percent. But in the two major June and December surveys of

crop acreages and livestock inventories, production and disposition, the proportion of returns which can be paired is much smaller—in the neighborhood of 40 percent. The loss of information in pairing is very substantial in these two major surveys and we, therefore, are attempting to avoid this loss by processing and using the non-paired as well as the paired portion of the returns. The importance of the two major surveys may be indicated by the statement that they are the principal sources of estimates of the number of crop and animal producing units on farms, which in turn are components of farm production statistics.

The non-paired portion of the samples is processed and combined with the paired portion to yield sample indications of averages or means per farm, and also some ratios of similarly biased sample statistics, such as the ratio of durum wheat to total wheat acreage and the ratio of cows milked to cows available for milk. By using the current mean per farm as a ratio of the mean from the previous survey, the consistent bias is eliminated and a relatively unbiased indication of change is obtained. The problem is, of course, to obtain as consistent a bias as possible from survey to survey. This problem we have not satisfactorily solved as yet. When the problem is solved, it is almost certain that Canada will adopt the graphic regression technique of interpreting sample indications.

Given our organizational situation, our approach to stability or consistency in our samples has tended toward control by stratification. Almost from the beginning, Canada's agricultural statistics have been geographically stratified and estimates for geographic regions obtained where possible. The geographic stratification seems to have been a result of administrative desire for statistical data for areas smaller than provinces, rather than a deliberately chosen aid to more reliable provincial estimates. In fact, it has been necessary in recent years to forego some estimates for areas within provinces because of the small size of samples available. The crop district and county have been the standard estimating area within provinces. The crop district is a deliberately chosen area composed of small contiguous administrative or political units grouped according to the principle of as much homogeneity as possible, agriculturally. The county is a standard political-administrative unit in all provinces east of Manitoba. There seems to be little doubt of the effectiveness of geographic stratification for agricultural statistics. Because of size of sample restrictions, only the principal crop acreages and yields and livestock inventory numbers on farms are currently available for areas within provinces.

Other types of stratification have been employed to a limited extent, the strata being related to the size of the farm enterprise. The results from this type of control of sample bias have not been very satisfactory so far. It is expected that the Census of Agriculture, 1951, will provide a

much more up-to-date and more complete description of the agricultural universe than has been available to the present, and progress in bias control by stratification may prove to be a future improvement. Bias control, rather than bias elimination, is the goal of stratification in voluntary mail samples.

The importance of independent and reliable check data provided by censuses and properly designed probability samples cannot be stressed too much. The data are used not only as a guide to the level and the trend of intercensal estimates, but also as prerequisite information for stratification of voluntary mail samples. There has been very gratifying cooperation from the Census Division of the Bureau in planning for and providing as much pertinent check data as possible from the regularly scheduled Censuses of Agriculture. Other government departments and agencies have also provided much valuable check information, particularly during the intercensal periods. Further progress in this direction is expected. For example, the Department of Agriculture is actively attempting to adapt its probability sample surveys to provide intercensal benchmarks and other check data as a by-product. A little adaptation may yield a large marginal return.

Perhaps the most important check on official agricultural statistics is the user of those statistics. The consumer of official statistics, as of other commodities and services, is sovereign in the long run, in spite of the fact that such statistics are not produced and consumed under competitive market conditions. In presenting this outline of the nature of Canadian agricultural statistics based on samples, the writer hopes that consumers of these statistics will find it of some assistance in their interpretation and contructive criticism of available statistical data respecting Canadian agriculture.

ORGANIZATION OF AGRICULTURAL STATISTICS WORK IN CANADA

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THIS paper is primarily concerned with the description of the organization which has been developed in Canada to provide agricultural statistics of a continuing nature. This includes the official statistical series published by the Dominion Bureau of Statistics on its own account and in cooperation with the provinces. The various by-product statistics collected and compiled by other government departments and agencies will also be discussed in so far as they are of a continuing nature. Statistics not of a continuing nature, i.e., those obtained from economic surveys conducted from time to time will not be considered. It is pointed out in passing, however, that information from these special surveys is a great aid to statisticians in the work of providing official statistics.

The development of the present organization for agricultural statistics in Canada came about primarily for two reasons: first, to provide Canada totals for the various series collected by individual provinces and to obtain statistics in provinces where none were being collected; and, second, to have some central agency responsible for the coordination of statistical work in order to avoid duplication in collection and to have consistency in methods of collection.

In the field of agricultural statistics prior to 1908, there were no estimates or statistics covering the whole of Canada excepting those gathered at intervals by the censuses. In 1908 a permanent census and statistics office was established under the Minister of Agriculture. The act under which the office was established provided that "the office shall collect, abstract and tabulate agricultural, commercial, criminal, educational, manufacturing, vital and other statistics and information from time to time in the intercensal years of each decade in such ways and manner as are found most practicable." Even after the setting up of the statistical office, other statistical branches within the federal service continued to increase in number and scope. The increase in the number of other statistical branches and consequent duplication of effort and diversity of results in many fields of statistics led in 1912 to a suggestion that some effort be made to coordinate and unify Canadian statistics. To this end, a commission was set up and a report made recommending the organization of a central Canadian statistical office to bring under direct control all statistics except those which are by-products of departmental administration, supervising these latter in order that they might be made as useful as possible from a general point of view, and establishing a

system of coordination with provincial governments in order that statistics collected by provinces in the course of administration or otherwise might be rendered capable of inclusion in Dominion totals.

Of particular importance to agriculture, the following are some of the recommendations made by the Commission:[1]

1. That arrangements should be entered into by the Dominion and Provincial authorities to secure by cooperation:
   (a) The collection at a given date of annual statistics of areas under the principal field crops and the numbers of farm livestock.
   (b) The adoption throughout Canada of uniform methods for the classification, collection, and compilation of agricultural statistical data.
   (c) That for special crops such as fruit and tobacco, the cooperation should be obtained of the Fruit and Tobacco Divisions of the Department of Agriculture both with regard to statistics and monthly crop reports.
2. That the collection, from reliable sources, of the market prices of agricultural produce be undertaken with a view to the regular publication of records of prices on a comparative basis.

The recommendations of the Commission of 1912 were crystallized in the Statistics Act of 1918 and the setting up of the Dominion Bureau of Statistics in the same year with a mandate "to collect, abstract, compile and publish statistical information relative to the commercial, industrial, social, economic and general activities and conditions of the people."

It is interesting to note the development of cooperative arrangements with the provinces. An address by Dr. R. H. Coats, Dominion Statistician,[2] reads as follows:

> The Dominion Bureau of Statistics has a very large interest in agricultural statistics, undoubtedly the largest interest of any official body. But we are not alone. The provinces are sovereign bodies. Saskatchewan, for instance, has an interest in her agricultural statistics that is second to none. Perhaps, therefore, I might state the exact legal basis on which the Bureau stands and on which we have called this conference.
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> Under the British North America Act, statistics are one of the subjects pertaining to Dominion as distinguished from Provincial jurisdiction. This does not mean, of course, that the province may not collect statistics. It does, however, imply that the Dominion Government has the duty of organizing the statistics of the country as a whole and for national ends. The Federal Statistics Act, accordingly, gives the Bureau of Statistics right of access to all provincial, municipal, and other public records. Further, it directs the Bureau to enter into statistical arrangements with the provinces for the delegation of powers, interchange of data, extension of franking privileges, and cooperative purposes generally. It is under this provision that we have called together the present conference.

Mr. Godfrey, Chief of Agricultural Statistics at that time, also made an

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[1] Report of the Departmental Commission on the Official Statistics of Canada, 1912.
[2] Conference on Agricultural Statistics held in Ottawa, January 29-31, 1924.

interesting statement at this Conference about the status of agricultural statistics in 1924. I quote:

> My memory goes back to 1907 when I first entered the Dominion Government Service. At that time the situation was very different from what it is now. There were then no national annual statistics of agriculture. There were no agricultural statistics in the Atlantic provinces excepting for some of the principal crops in New Brunswick, and there were none in Quebec. In Ontario the late Dr. Blue had instituted in 1882 those admirable agricultural statistics which are ably continued by Mr. Galloway, who is with us today. In Manitoba annual agricultural statistics have been collected since 1883, except in 1888. In Saskatchewan and Alberta agricultural statistics were begun with the constitution of these provinces in 1905. In British Columbia there were no annual agricultural statistics.

Of interest to this meeting, I am sure, is the fact that Mr. Callander, Chief of Agricultural Estimates in the United States Department of Agriculture for many years, was a visitor to this first Dominion-Provincial Agricultural Statistics Conference in Ottawa. Through the years Mr. Callander and other officials of the Agricultural Estimates Branch of the Bureau of Agricultural Economics have aided us greatly in the development of our statistical work in Canada.

The role of the Bureau of Statistics, as envisaged by the Commission of 1912 and restated by Dr. Coats in 1924, is being carried out at the present time. The Bureau of Statistics in its agricultural work maintains close cooperation with the provinces and with Federal Government departments and agencies such as the Board of Grain Commissioners, the Wheat Board, Provincial Milk Boards and like organizations. In the following paragraphs the nature of the work done by these various bodies will be discussed, as well as the organization which has been established to coordinate the work.

The Dominion Bureau of Statistics is divided into several Divisions, viz.: Administration, Agriculture, Census, Education, Health and Welfare, Industry and Merchandising, International Trade, Labour and Prices, Mechanical Tabulation, Public Finance and Transportation, Research and Development, and Special Surveys. Apart from the interrelation of work on agricultural statistics within the Bureau, there are several advantages of the centralized organization which might be cited at this point. Within the Bureau there is a large pool of specialized tabulation equipment which would be costly to provide for several decentralized units. Consulting specialists in mathematical statistics and economics are available for the various divisions. The work of compiling data for use in National Accounts and National Income is reduced greatly by coordination of effort throughout the Bureau to produce such statistics. It is a great saving of time for the public and government officials to be able to go to one source for statistical data rather than to have to draw from various

departments. Of importance, too, is the public relations position established by the Bureau throughout the years. The Bureau is an independent, impartial organization, concerned only with production of statistics. Individuals providing statistics are protected by law in the matter of non-disclosure of individual returns. The work of collecting statistical information is made much easier when public confidence is established; and a unified approach by one agency again is much simpler than having several agencies in the field.

Of particular importance to the work of agricultural statistics within the Bureau are the various mechanical units which are available in a centralized organization. The Agriculture Division has over 300,000 addressograph plates for collection of current agricultural statistics. These are serviced by a separate unit within the Bureau. An up-to-date printing plant in the Bureau building is maintained by the Department of Public Printing and Stationery. Timely publication of scheduled reports is possible under such an arrangement. Aid is also given to the Agriculture Division from time to time in editing and tabulating work by other units within the Bureau.

Some disadvantages of a centralized organization will be apparent to workers in agricultural statistics. The chief one is separation from the Federal Department of Agriculture. This disadvantage is particularly pertinent with respect to the difficulty of achieving a thorough integration of the work in agricultural economics and agricultural statistics. Collection of agricultural statistics from sample surveys requires a great deal of knowledge about the universe in agriculture, some of which can only be made available through enumerative surveys now carried out largely by the Economics Division of the Department of Agriculture. Close liaison with workers in all branches of agriculture is also essential for proper interpretation of sample indications. Later in this paper the means established to overcome the difficulty of an agricultural statistics unit, functioning apart from the Federal Department of Agriculture, will be discussed.

Within the Bureau of Statistics two bodies deal principally with agricultural statistics, the Agriculture Section of the Census and the Agriculture Division. The Agriculture Division is responsible for the current estimates for agriculture, while the Census is concerned with collecting and compiling data for the decennial Census and for the quinquennial Census of the three Prairie Provinces. Close cooperation exists between the Agriculture Division and the Census. Personnel from the Agriculture Division staff were members of a committee which decided on the 1951 Census schedule. Members of the census staff attend interdepartmental and Federal-Provincial agricultural statistics committee meetings. Such liaison is of great importance. For example, wording of questions for various surveys and the census has been unified. Provision for bench

mark material necessary for agricultural estimates has been made and special tabulations to give a more adequate description of the agricultural universe will be forthcoming from the 1951 Census.

Other divisions in the Bureau provide information relative to agriculture, particularly with respect to processing and utilization of agricultural products. Such information is of great importance to the agricultural statistician in secondary documentation work. The Industry and Merchandising Division makes periodic surveys of a number of industries related to agriculture—mills, breweries, canners, meat packers, and so forth. The Prices Division maintains an index of wholesale prices of farm products and an index of the cost of things farmers buy, as well as a farm family cost-of-living index. The Special Surveys Unit makes quarterly estimates of the farm labor supply. The Agriculture Division maintains close touch with all this work by personal contact and through liaison committees. Of importance, too, is a Joint National Income and Agricultural Farm Finance Committee which coordinates the work of providing agricultural data needed for national income and accounts.

The Agriculture Division is divided into three sections—Crops, Livestock, and Research and Compilation. The Crops Section is responsible for estimates of acreage and production of all field and special crops, including fruits and vegetables. A monthly census of sugar refineries, flour mills and oil crushers is conducted and reports on all the above issued. Food balance sheets and consumption of food per capita statements are prepared in this section and two reports of an analytical nature are also published—*The Wheat Review* (monthly) and the *Coarse Grains Quarterly*. The Livestock Section is responsible for the semi-annual livestock and poultry estimates, annual wool and meat statistics, monthly information on eggs, milk, milk products, and reports on cold storage holdings of food products. The Research Section is divided into a Compilation Unit, Research Unit and Farm Finance Unit. The Compilation Unit edits and compiles the semi-annual acreage and livestock surveys and doubles as a work pool for other units. The Farm Finance Unit has charge of the primary surveys of prices received by farmers and wages paid by farmers; is responsible for the construction of the monthly index of farm prices and the annual index of farm production; undertakes the secondary documentation of farm cash and net income; and prepares annual statements on the value of agricultural production, farm capital, and the average value of farm lands. The Research Unit is of recent origin and has been inquiring into processing and estimating procedures for voluntary mail sample surveys both current and historical. In effect, it provides a nucleus of trained trouble-shooters and assists in maintaining a close coordination of technical operations.

The work outlined above is not all done by the Agriculture Division,

as provincial government agencies aid greatly in the compilation of results for certain surveys. The Bureau has no formal agreements with the provinces in carrying out this work. Unlike the United States, all provincial agricultural statistics offices are autonomous units. No federal payments are made to these offices and no federal statistical officers are attached to provincial staffs. The Bureau has no control over policy of the provinces with respect to agricultural statistics. Nevertheless, a high degree of cooperation on a partnership basis has developed between the provinces and the Bureau over the years. Motivations for this cooperative effort come chiefly from mutual desires to avoid wasteful duplication in effort and to provide timely statistics as economically as possible.

Liaison is maintained with provinces by personal visits of federal men to the various offices from time to time and by an annual federal-provincial conference or meeting each year. Commencing last year, a new development was introduced by the appointment of a federal man to be stationed in the Atlantic Provinces to aid in developing statistical work there. No agricultural statistics offices are maintained by the Atlantic Provinces and much work is required in improving sample returns from these areas.

The arrangements with the provinces include mutual agreements on the division of work, help in obtaining new correspondents, and agreements on methods to be followed in editing, compiling, and estimating. The schedules in use are discussed and agreed upon. In the crop and livestock estimating work, and for some of the annual provincial statements in which provinces cooperate, mutual agreement is reached before publication. In the case of crops and dairy statistics, dates of publication are established and adhered to. Target dates for other reports are set out at the beginning of each year.

The actual division of work between the provinces and the Bureau varies a great deal for the different provinces. The amount done by a particular province depends somewhat on the stage of development reached when the Bureau came into the picture, and the resources available for assuming a portion or all of any new work which occurs. For the most part, the Bureau provides the questionnaires and looks after the mailing with provision of return envelopes to the provinces for survey material tabulated by them. In the large June and December surveys, Ontario undertakes its own tabulation of results in both June and December, Manitoba compiles its returns in June, whereas for all other provinces the Bureau does the work. The Quebec Bureau of Statistics aids in both surveys by "pairing" the forms with those received in the previous surveys. In the crop-estimating work, Ontario, Quebec, and British Columbia undertake their own compilations, while Saskatchewan does part of the compilation work. Similar arrangements exist in the monthly fluid milk surveys; the Ontario and Quebec Statistics offices compile the results

for their provinces, the Milk Boards of the four Western Provinces compile data for cities and towns under their control, whereas for the Maritimes and uncontrolled markets in western Canada the Bureau does the tabulation work. In the monthly census of dairy factories, the Dairy Branches of the Provincial Departments of Agriculture and, in some cases, provincial statistics offices tabulate returns and wire results to Ottawa by the 6th or 7th of the following month. The report is generally published by the 10th to 12th. Joint arrangements also exist for surveys of fruits, vegetables, honey, maple products, and fur farming. In two provinces, Ontario and British Columbia, local committees provide fruit and vegetable crop estimates.

Liaison with the Federal Department of Agriculture is maintained chiefly by personal contact. A formal interdepartmental committee has been set up, however, and six subcommittees are functioning, viz., field crops, fruits and vegetables, livestock, dairying, poultry, and farm finance. Most of the work is done at the subcommittee level and personnel of the committees include representatives from the Economics Division, Department of Agriculture, the Bureau of Statistics and administrative men from the Production and Marketing Services of the Department of Agriculture. Often national association representatives are called in, such as officials of the National Dairy Council, Farm Federation, and Fruit and Canners Associations.

At the meetings the sources of data and methods of producing agricultural statistics are discussed, including statistics originating in the Federal Department of Agriculture. Of importance, too, is the review of publications to determine what might be dropped, added, or extended. Discussions on development of new work also takes place, and the Department of Agriculture, being one of the principal users of agricultural statistics, is very helpful in directing attention to the nature of changing demand for statistics.

The Federal Department of Agriculture produces a considerable volume of statistics as a by-product of other functions. Cases in point are the detailed statistics on weekly marketings, prices and slaughter of livestock. Statistics of gradings of dairy products, eggs, fruits, and vegetables also form an important part of the statistics of agriculture. A fairly recent report gives data on monthly chick hatchings. This is not necessarily a complete list, but serves to illustrate the nature of the material collected through inspection service channels. The Department of Agriculture also aids the Agriculture Division directly in collecting certain types of statistics. Fruit and vegetable inspectors, for instance, obtain reports of stocks in store during the storage season and forward the data to the Bureau. The inspectors in the Production Service provide estimates each year of the production of forage crop and garden seeds. It would be very

difficult to obtain estimates of these crops by the mail questionnaire method. The Bureau also obtains a great deal of information from surveys conducted by the Economics Division of the Department of Agriculture. The Economics Division is, in turn, in direct contact with the Farm Economics Department of most universities, and it is hoped that in the near future more information can be obtained on farm income and expenses. This is one field where the Bureau lacks sufficient current information, especially in the expense field, and has to resort to the rough projection of census data, generally not too good for this purpose.

The cooperative arrangements with the Board of Grain Commissioners and the Canadian Wheat Board can be discussed together. A coordinating committee composed of officials from these agencies and the Bureau meets from time to time to determine division of responsibility relative to collection and publication of grain statistics. The Statistics Branch of the Board of Grain Commissioners compiles a host of current data on the primary marketings of grains in western Canada and stocks and movements of grain to all parts of Canada and on export. Weekly reports are issued, constituting a virtual census of the quantity of each kind of grain delivered by farmers, stocks of grain in store at various positions, rail and lake movements, prices and exports. The Bureau republishes much of this information in a weekly report, in addition to data on eastern grain situations. The Board and the Bureau cooperate in the publication of an annual report of the grain trade each year. The Wheat Board statistical office is very helpful in providing data on permit acreages, intended marketings, and other information required to keep the Agriculture Division in touch with the current marketing position.

This paper would not be complete without some mention of the help of thousands of individual farmers, dealers, and others who voluntarily reply to Bureau questionnaires, and of industries which supply the Bureau with data on acreage and production from their records of deliveries from contract acreages. Then too, organizations such as the Wheat Pools, Line Elevator Companies, private statistical services, and business firms in general all contribute a great deal of valuable information in the agricultural statistics field.

DISCUSSION

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The present organization for agricultural statistics was designed to provide a central agency to collect data, to coordinate the collection of data, to provide continuity and to avoid duplication. As has been pointed out, the Agriculture Division of the Dominion Bureau of Statistics provides these services. This

organization releases, in a number of publications, data pertaining to farmers' intentions to produce, estimates of actual production, consumption, trade and prices of agricultural commodities. The sources of such data vary. In some instances they are the by-products of other government inspection agencies, while in other instances they are obtained directly from farmers. Some data are obtained directly from the source by other divisions of the Dominion Bureau of Statistics and are included in the Agriculture Division releases to complete the body of information contained in their reports.

It may be said that the Dominion Bureau of Statistics, and more particularly the Agriculture Division, is successful in these efforts to collect and to coordinate the collection and presentation of data pertaining to agriculture. The small size of the organization, relative to the magnitude of its task, means that it must take advantage of a number of arrangements to increase its effectiveness. This condition is both an advantage and a disadvantage. In the first place, duplication of effort is reduced by arrangements with provinces for the compilation of crop and livestock semi-annual estimates, for example. On the other hand, it may be that insufficient control by the Bureau makes adequate coordination very difficult. However, as long as financial agreements and/or the Bureau's field officers are either not available or insufficient, such arrangements as do exist are probably the closest possible approach to the desired coordination and consistency.

The Agriculture Division collects most of its primary data by means of sample surveys in which mailed questionnaires are used. The universe which is being sampled in this way is described largely by data of the census. The presence of a changing universe causes difficulties in interpreting and evaluating sample returns, particularly when the date of the survey is far removed from the date of the census. It has been suggested that surveys by personal interview could provide much of the necessary knowledge of the universe of intercensal years. Some, although by no means all, information regarding the population being sampled can be provided in this way. At least useful checks on mail questionnaire returns could be made available. But the limited extent to which such surveys can be conducted, and the extent to which they can be adapted to provide special information needed by the Dominion Bureau of Statistics, seriously curtail the contribution that other government agencies can make while discharging their normal duties. The Decennial Census may be the source of much more information than is now readily available. Fundamental relationships first determined by means of personal interview surveys may be further revealed and illustrated by census data. This may involve a study of the census data requiring much more time and attention than existing agencies have had available for such work. A study of this nature could well result in a body of information approaching the master sample of the United States. In order that such information can be used effectively, there is need for further study of fundamental relationships required in connection with stratification.

The improvement of sample surveys by enumerator or mailed questionnaire is, in my opinion, an important step in increasing the reliability and in extending the coverage of agricultural statistics in Canada. Such work is progressing in connection with the Census, and its extension to the work of the Agriculture Division may provide more reliable data at a lower cost than at present.

From time to time the data being collected by the Bureau are reviewed, new series are commenced, and old series are revised or dropped. This is as it should be if the limited resources available for such work are to be used effectively.

But it is suggested that greater care be taken in dropping time series that, at the moment, seem to have lost their usefulness. At the same time, a new series is not useful until its relation to other factors can be established. There are not many occurrences more frustrating to a research worker than to find at an advanced stage of a study that time series are not consistent throughout a given period, or that they have been discontinued part way through a period. A number of times series have been revised for only a short period back—the pressure of current work being the reason given for not carrying revisions further. Some of these need to be carried back further if they are to enjoy optimum use.

The reliance of the Dominion Bureau of Statistics on other government agencies for certain data, which is incidental to inspection services, should be accompanied by a responsibility to check the actual method of calculation and reporting by inspectors. Experience shows that sometimes these by-product data are lacking in accuracy. Errors in calculation and reporting may occur simply because the originating agency does not realize what is expected of it nor the importance of the data it provides.

Statisticians and economists working in the field of agriculture recognize a great many of the shortcomings of the present methods of collecting data and are constantly striving to improve the reliability and coverage. During the past 20 years many improvements have been introduced. It may be expected that continued close cooperation between originating and using agencies will result in further improvements.

SOME APPLICATIONS OF UNITED STATES EXPERIENCE TO DATA PROBLEMS OF OTHER COUNTRIES

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Bureau of Agricultural Economics

THE crop and livestock estimating methodologies of the United States are a popular object of inquiry and study for visting statisticians from other countries. Almost every year since World War I we have had the pleasure of conferring with visitors from different countries about our current sampling, estimating, and reporting techniques. Usually there has been time also to touch upon the results of new methods or improvements which were currently under test to meet changing agricultural practices or new reporting requirements. Foreign visitors also have gone away with some useful points on methodology which they felt might apply to conditions in their countries. In turn, we have gained worthwhile ideas and a better understanding from these discussions, and a bond of mutual interest has been established which has provided much added pleasure and profit from subsequent exchange of experiences and ideas.

Our association with the statistical affairs and problems of other countries has been materially expanded in a short time. From the occasional, leisurely contacts and discussions of earlier years, we have come within the cross-fire of all kinds of movements for improving agricultural statistics around the world. Over the last 10 years, and especially since 1945, our statisticians have been called upon much more extensively to take part in a variety of programs, all aimed at helping other countries to establish or improve their statistical reporting services. The requests for services of men trained in crop and livestock estimating methods have become so varied and so numerous that frequently we find ourselves unable to meet all demands.

The impetus for this intensified interest in having good, reliable data to work with has come mainly from the growing development and effectiveness of international organizations and activities. These have provided increasing means for countries to work together in attacking common problems, or in considering matters of broad concern relative to world-wide food supplies and agricultural productivity.

Quite a few countries do have very excellent and complete statistical systems which keep them well informed on the agricultural segment of their economy, both as to its historic development and its current status. One of the best is to be found right here in Canada. We should take note, also, that good progress has been made over the years in developing and improving the statistics for agriculture on a world-wide basis. The

pioneering and persistent labors of the International Institute of Agriculture at Rome, and the parallel efforts of the nations most advanced in statistical reporting, made major contributions to the earlier progress in this field.

Nevertheless, today many countries have comparatively little data to keep them advised as to the actual extent and character of their agriculture. Nor do they have the necessary current facts to discuss or intelligently appraise the changes occurring in their production of crops and livestock, or other adjustments in farming operations. Without these facts, they find that they must operate pretty much in the dark in making plans or decisions for improving their agricultural output or the welfare of their agricultural producers. These shortcomings in their basic data have become more sharply evident to most countries in recent years as they have joined in the various international movements or have sought assistance on programs of their own. There is a growing awareness in practically every country that, to undertake constructive measures, they must have more knowledge of the facts regarding their agricultural resources, crop and livestock trends, and current production and needs.

It is not surprising, then, that in one country after another a determined effort is being made to get some sort of effective program into operation. And in this the countries are seeking all the outside help and guidance they can obtain. Some must start from scratch because the project is entirely new to them; other countries, in which some statistical services are already established, intend to review and revise the entire structure and to concentrate on the types of current and historic facts most needed, eliminating the statistical series or reports that are of little use. Again, some countries are able to make only a small beginning because of limited finances and resources, whereas others will be in position to lay plans for the gradual development of a full-scale system. Countries that have previously had no significant statistical activity or experience will have to have special guidance to avoid undertaking an overly-ambitious program. In such cases it is obviously best to start with a moderate sized project and to employ the simpler techniques, until further momentum develops from experience, and until continuity of the program is assured, directed, and carried along by well-trained statisticians and workers.

In making their plans, most countries have shown evidence of placing a proper emphasis on the several major types of fact-collecting processes. For example, they have generally recognized that it is essential to establish (1) a system for securing dependable and complete bench-mark data, such as are obtained through periodic census enumerations, and (2) a minimum system of current reports to provide timely crop and livestock estimates throughout the year. Other types of data are not overlooked,

such as agricultural prices and records of commerce and trade in agricultural products.

Much encouragement and assistance have been directed to the effective development of these census and current reporting objectives by the several international organizations most concerned. Prominent among these is the Food and Agriculture Organization of the United Nations (FAO), now in its sixth year of constructive accomplishment. The FAO has concentrated on adequate statistical reporting as one of its foremost objectives, and has applied full effort to assure that the 1950 World Census of Agriculture will be the most satisfactory yet undertaken. In the Latin American countries, the Inter-American Statistical Institute, as well as other inter-American organizations, has given major emphasis to better statistical reporting for the past 10 years, and have applied similar drive to the successful completion of the 1950 Census of the Americas.

The assistance for which the services of our BAE agricultural statisticians are requested falls mainly in two major categories. One concerns their service as special consultants on assignment to some country for varying periods of time, to advise and assist the officials responsible in the solution of some basic data problem or in the general improvement of their reporting system. The other relates to a variety of services rendered in the training of selected candidates or officials from other countries who are sent to the United States by their governments, or under other auspices, for specific study in the field of agricultural statistics, including census and crop reporting methods. A variation of the latter is the participation of our statisticians in a training center, sponsored by some international organization or group, to which selected representatives are sent by the several governments concerned. An illustration is the training center recently conducted in San Jose, Costa Rica (January through March this year) under FAO auspices, with the special cooperation of the Costa Rican Government. Several of our men, or former members of our staff, took part in the organized instructional sessions, which combined lectures, demonstrations, practice-periods, and roundtable discussions.

Before turning further to the subject of foreign trainee programs, which are about to be greatly expanded, I should like to give you a few impressions of the varied character of our statisticians' assignments to other countries as special consultants.

We had several calls for assistance as an outgrowth of the military occupancy of Japan and Germany. In the effort to get the agricultural economy of these countries back in good working order, the military government applied major attention to gaining maximum domestic output of food production at the earliest time, so that adequate diets might be restored with a minimum of outside aid. Other measures were aimed

at improving agricultural practices or productivity. Quite often the occupation authorities found their plans badly hampered through the failure of the existing crop reporting service to provide dependable crop production figures, or the complete set of facts needed for the job.

In May 1946, at the request of the Department of the Army, the statistician in charge of one of our State offices was selected for assignment to General MacArthur's headquarters staff in Tokyo. He was given the task of studying the organization and operation of the Japanese crop reporting system, and requested to draw up workable recommendations for improving the accuracy of official forecasts and estimates. His analysis and recommendations resulted in the Japanese Government being asked to centralize their agricultural statistics program in the Ministry of Agriculture and Forestry, to reorganize the work so that the new National Crop Reporting Service (instead of the 46 Prefectural Governments) would have complete and undivided responsibility for the statistical program, and to undertake certain research studies to improve the crop estimating and forecasting methods. He assisted in getting the reorganized service into operation before returning to the States late in 1946. In the fall of 1948 and early 1949, another of our statisticians was called in by the Army to review the progress made on the Japanese program and to suggest any further changes or developments that seemed desirable. He recommended an expansion in the program of estimates and forecasts to include more crops, a reduction in the emphasis upon too frequent census-type enumerations, for which a suitable objective-sample type of survey could be substituted, and other suggestions for the closer integration and control of the crop reporting work, so as to preserve complete freedom from bias in its reports and decisions. Early in 1949, another statistician formerly in our organization joined the Tokyo headquarters staff and had the opportunity of lending a guiding hand in the crop reporting program.

Two members of our staff struggled with the problem of establishing some sort of a statistical reporting system in the hectic early days of the occupation of Germany. These difficulties continued and in Western Germany the food and agriculture officials of the Bipartite Control Office had met with increasing difficulty each crop season through 1947, in establishing reliable production estimates for major food crops and other staples. A dependable degree of accuracy in these estimates was essential if the various measures to meet even a minimum of the food requirements were to be successfully carried out. The total production estimates were the foundation for the crop quota and collection programs, the determination of minimum import requirements, and plans for equable distribution of foodstuffs among the German States in the American and British Zones. Under prevailing conditions, there was mutual dissatisfaction with the

wide divergence between the figures obtained through the German crop reporting system, which were obviously ultra-conservative, and those developed by Military Government officials through a series of field checks in sample fields, which the German officials protested were much too high. The services of two U.S. crop statisticians were secured by the Bipartite office for a period of several months during the 1948 crop season to assist a Bizonal Working Group in devising and carrying out an objective yield sampling plan that would be technically sound and acceptable to all parties. The working party, made up of Military Government personnel and German officials, was purposely kept small to expedite the formulation of plans. A scientific scheme for taking sufficient sample field checks to provide acceptable crop yield estimates for each state, on winter rye, winter wheat, and the main or late potato crop was agreed upon. Field working parties were organized, again made up of both Allied and German personnel, and the field checks were completed according to plan. For the first time in occupation history, the yield estimates satisfied all parties. The German officials, convinced of the merit of this objective sampling procedure, have continued to make the crop yield checks every year since 1948. At the moment, it is our pleasure to have two of the German statisticians who served on the Bizonal Working Party with us for several months of intimate study and observation of our crop and livestock reporting methods and operations.

An ECA three-man statistical mission is just now completing an assignment of more than a year assisting the Turkish Government in modernizing its crop reporting system and instituting some of the newer probability sampling techniques to improve the quality of their data. Better timing, involving much earlier release of data for maximum usefulness, is another major objective. An imposing array of agricultural statistics in great detail are published by the Central Statistical Office in Turkey, but they have generally not been available until two years after the crop year harvest to which they pertain. The Statistical Office fully realized that the present program was not adequately serving the needs of the expanding national economy of the country. By request of these Turkish statistical officials, the leader of the mission spent five weeks in the fall of 1949 in preliminary consultations, to analyze the situation, develop recommendations for improvement, and arrange for the special assignment of the three-man group. Excellent progress had been made in preparation for the 1950 agricultural census in Turkey. Among other plans, arrangements were made to conduct a probability sample survey at the same time as the agricultural census enumeration, to obtain at least a partial measure of the bias believed to be inherent in a census taken by village headmen. An interesting sidelight of the preliminaries to the Turkish project was the selection of 10 qualified trainees to come to the United States for

six to nine months' intensive training in sampling and estimating methods, census procedures, and statistical collection processes in other than agricultural fields.

A Puerto Rican project undertaken about two years ago has provided some experiences and results that should prove useful in application to similar situations in some Latin American countries. The Puerto Rico agricultural officials developed plans for establishing a program of crop estimates and market news reports, and arrangements were made to assign one of our men to advise and give general direction to the development of the project. In the first year or so, major attention had to be directed to research and exploratory work to devise the sampling procedures that would be most adaptable to agricultural conditions on the Island, and which might provide, at moderate cost, the soundest basis for reliably forecasting and estimating production. The problem is greatly complicated by the fact that succession cropping on much of the land is practically a year-round process. The usual type of survey procedures do not fit these circumstances. An exceptional opportunity was provided under this project to conduct a quality check of the agricultural census data and the data obtained in the several special enumerations made by the Puerto Rican officials. Work on these quality checks and comparisons has been undertaken in cooperation with our Bureau of the Census. The program has now reached the stage at which a minimum schedule of crop reports has been established for release throughout the season, for the six most important crops in the Island's commerce.

One of our former statisticians and several others of our present staff have been stationed in Latin America, or assigned for limited periods, to advise and assist the various countries in completing their 1950 census enumerations and the compilation of results. On these assignments, frequent opportunities are presented also to help these countries in their plans for the development of current crop reporting programs. Many of the countries are now engaged in improving and expanding their reporting operations. Among their key technicians, there are quite a few who had been selected by their governments in years past to spend a period of time in the United States for special training in crop estimates and census methodologies.

Both the consultant work and the foreign trainee plans are to be greatly broadened and accelerated as a result of the establishment of what has been popularly called the Point IV Program. This is the program for furnishing technical assistance to underdeveloped countries, set forth by President Truman as a definite feature of United States foreign policy, in his Inaugural Address in January 1949. The plan, in effect, is an extension to new areas of the program of technical collaboration begun by the United States in Latin America in 1940. As has been true in Latin America, it can be anticipated that considerable of the technical guidance

and assistance sought by many countries will relate to agricultural matters.

Point IV is only the latest development among several programs that arrange for foreign officials and trainees to visit the United States for special study or education. Such missions are sponsored by a number of agencies, including ECA and FAO. All in all, there are 13 different acts in effect under which selected agricultural leaders or trainees can be brought to the United States to study and observe different aspects of our agricultural activity. It is estimated that as many as 3,000 agricultural leaders from 77 countries will visit the United States in 1951. Only a small percentage of these will be interested in statistical training, and observation of methodologies used. However, during the last year, we have worked with 40 individuals from 22 different countries, who spent from a few days to several weeks with us. In addition, we have put on one-day programs for six special groups of foreign visitors, numbering about 80 people.

Under the Technical Assistance Program, tentative plans have been formulated by the Office of Foreign Agricultural Relations, in close collaboration with our Bureau, to enlarge substantially and reorganize the program for instructing statistical trainees. There are several important stages or phases to the total program, some preparatory to the training of selected candidates, and others concerned with follow-up assistance or consultation following the training period in the United States. All these phases will be directed by OFAR. Our organization will be concerned principally with the instruction of the foreign trainees, to involve a training period of about a year's duration.

While the plans are still subject to modification, it is felt that the training period should provide a general but clear understanding of the American agricultural economy, and full opportunity to become thoroughly acquainted with all aspects of agricultural statistical work. In general, this would include orientation in the need for statistics and the variety of uses they serve; first-hand study of crop and livestock reporting and agricultural census-operations, including planning, collection, tabulation, analysis, and publication; and finally, training in sampling and related specialized techniques. Throughout the training, emphasis will be placed upon practical aspects of the work. Orientation and initial training will be given in Washington. Thereafter, to the maximum extent possible, training will be conducted in state statisticians' offices at a few selected locations where agricultural college course work is available. This is the general outline. It is recognized that not all visitors can be fitted to any single pattern because of variations in the problems of the different countries, in the background and education of the trainee, and in the length of his training visit.

With respect to the tentative plans for establishing field-training centers

at two or possibly more points having agricultural college facilities available, several of our state offices—notably Wisconsin and North Carolina—have already had previous experience in training ventures of this sort in cooperation with the respective universities. We will be guided substantially by the experiences of these several offices in developing final plans for the training centers.

I can think of no more fitting close to this discussion of foreign trainee programs than to quote from our Wisconsin State Statistician on his experience:

"Probably the best way to get American experience into foreign countries is to have the men from those countries study in the United States and then apply what they learn in their own environment after they return. We have had some experience in Wisconsin in trying to teach our work to foreign boys. Specifically, we have had about 40 men interested in it altogether. The earliest of these was a group of four in 1945—one from Cuba, and three Chinese.

"This experience suggests that when such trainees can stay long enough to enroll for a college semester or longer in a large university so that a solid group of courses can be offered, together with some special training in our work, the best results are obtained. Much as they need our work, they also need with it other basic training such as economics, statistics, journalism, sociology, and the like, and a few well chosen courses in these fields add immensely to what they take back with them. Also, the whole matter of teaching is greatly simplified by having an organized curriculum which makes it easy to provide a full-time program worthy and challenging to high caliber men. A group of men working together in such a program serve to provide mutual stimulation so that they will get more out of it."

DISCUSSION

SOL SINCLAIR
University of Manitoba

I find one serious omission in what otherwise is an excellent presentation by Mr. Holmes on the use of sampling for agricultural statistics in Canada. This omission concerns the purpose for which the statistics are gathered. Perhaps the purpose is so well known that to state it here would be superfluous. On the other hand it may be that there is no specific, or one, purpose, and therefore it cannot be defined. As a consumer of agricultural statistics I am concerned about this point, since in sampling the use of the statistics determines to a large extent the technique that is used in gathering the data.

I do not want to blame the Dominion Bureau of Statistics or the Agriculture Division entirely if the available statistics do not meet the purpose for which we may desire them. We are to blame if we do not indicate to these people what it is we want. I do not pretend to speak for all users of Canadian agricultural

statistics, but I want to point to a few things that I would like to see in these data.

I should like to feel that the data we get are representative of the population studied. That does not mean that an accurate picture can be expected. But if the sample is properly selected, it is possible to measure the magnitude of the sampling error, and the user of the data can decide as to their usefulness and significance in his own work. If a sample is a "set of units or portion of an aggregate of material which has been selected in the belief that it will be representative of the whole aggregate"[1] then what the Agriculture Division obtains, especially in the June and December material, is not a sample, and leaves the user in the dark as to its efficiency.

The final result obtained by the method described by Mr. Holmes is considered a relatively good estimate of the current over-all condition of Canadian agriculture. But the basic data have to be treated and processed by adding and subtracting information obtained from other sources. It raises the question as to whether the "saving in money and time costs" is really a saving. First, how good are the bench-marks or checks used; and second, is there not another method that will provide estimates at least as good but with a measurable error, and at the same or lower cost for information obtained?

On the first question of bench-marks I want to mention the use of agricultural data from the census. Mr. Holmes suggests that in respect of these "acceptance has been occasioned by lack of objective evidence to the contrary." This is significant. Census figures on agriculture are liable to considerable error. Those who have worked on farm economic surveys know something of the difficulties associated with completing the statements on livestock numbers and even on crop returns. This, with a trained enumerator and considerable time in enumeration. How complete then is the information on the census form when it is done rapidly and by enumerators paid on a per capita basis?

Another point is the adjustment for bias on the assumption of "consistent bias," There may be consistent bias in a population which is stable historically in all phases. But Canadian farms and farmers, especially in the West, are continuously changing in nature. Changes in farm size, methods of operation, mechanization, and personnel must influence the direction of bias in answers to mail questionnaires. In addition, there are the farmers who no doubt are influenced in their answers because of prices which are currently so dependent upon government action rather than upon the free market.

These are important considerations for the policy makers, in both government and industry, as well as to those of us who want agricultural statistics for the purpose of studying the economics of the agricultural industry. We require data that will reflect regional changes in production on a scale smaller than the Prairie Provinces, or even a single province. Due to lack of specificity in our statistics it is difficult to measure farmers' responses in production to price changes, except in a very general way. Even on the over-all figures it is often difficult to run a simple analysis, as when I attempted last year to calculate the trend in per capita production of agricultural products in Canada. (This involved estimates of population as well as agriculture.)

As a consumer of agricultural statistics I would like to see our data gathered in a manner whereby the degree of representativeness or magnitude of the

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[1] This is Yates' description of a sample, F. Yates, *Sampling Methods for Censuses and Surveys* (London: Chas. Griffin & Co., Ltd. 1949), p. 2.

sampling error can be determined. Furthermore, I want data that are not only country wide, but also have a high degree of detail and accuracy on a regional basis. A sample about which we can say more than "fairly well distributed" or "relatively representative" is desirable. And I want to feel too, that when this information is gathered by the Agriculture Division, the primary data are available to research workers in the field of agricultural economics. This of course may be too much to ask, since this information is gathered by the Federal Government. But we are all concerned with mutual problems, therefore there should be no distinctions, as indeed there are few in most of our dealings with the federal authorities.

I think Mr. Holmes implied in his paper most of the criticisms I made. As a layman in statistics I cannot prescribe the method that should be adopted. We have heard about the area sample used in the United States. If it is efficient we should adapt it to our conditions. If not, the challenge is before our statisticians and agricultural economists to develop the better techniques. But we should proceed rapidly, since at the present time considerable money and time are spent by research workers and governments in gathering basic data, much of which mean duplication. This should be eliminated and the efforts directed towards finer analyses of reliable data that will aid government and commerce in arriving at their policies for agriculture. Economic changes are rapid in our modern day and more complete knowledge is essential to avoid the errors of unsound policies.

DISCUSSION

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In the United States and Canada, systems of agricultural statistics have been evolved which render effective services to the agricultural industries in these countries. In each country the system is rather complex and involves the use of both subjective and objective approaches in ascertaining facts; it involves a census base at five- and 10-year intervals, some more frequent enumerations, and extensive recourse to sampling. Mr. Koenig has described quite adequately in his paper some of the important applications and possible applications of United States technical procedures to work elsewhere in the world. It seems appropriate to mention three general categories of countries in which improvement in statistical services to the agricultural industries might be developed, and the first steps which might be taken in that direction.

1. There are quite a few countries in which no agricultural census has been made. I include in this group a few countries in which an agricultural census has been attempted, but has not been successful. Most of these countries do not attempt to collect and publish current agricultural statistics. The need here is for a realization of the importance of current information on agricultural developments. Such a realization might be stimulated by an international organization such as FAO; it hardly seems the job of the United States or Canada. Attention of the responsible agencies in these countries needs to be directed along with other matters to the possibilities of establishing certain data basic to a current reporting service by recourse to samples rather than by the more expensive census approach.

2. There is a second group of countries which places undue emphasis on the counting or census approach to providing current information. This is characteristic of many European countries. Generally the publication of results is delayed, which minimizes the usefulness of the information. Associated in many cases with this approach is a general failure to obtain objective checks by which the validity of enumerated data may be tested. It would seem that in these countries there is a need for establishing an interest in forecasting crop and livestock production. The preparation of forecasts is a challenging task. It puts the organization on its mettle and vitalizes the work in this field.
3. There is a third group of countries in which almost complete reliance is placed upon the subjective approach to measuring agricultural progress. This takes the form of calling upon individuals for estimates of numbers and production for geographical areas, such as a county, province, state, or region, rather than relying upon individual farm samples taken at a time when facts are ascertainable, or upon objective samples such as measured production upon measured areas. The estimates obtained through the subjective approach are usually of questionable reliability both as to level and as to change from one date to another. The need in these countries is to make a start in sampling adapted to the circumstances and to the financial means available. Even a small start will produce large dividends.

IMPROVING LABOR EFFICIENCY IN FARMING

Chairman: H. C. M. Case, University of Illinois

IMPROVING LABOR EFFICIENCY THROUGH IMPROVING FARM ORGANIZATION

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SINCE 1940, agriculture has been operating in an economy having a high demand for farm products and a relatively scarce labor supply. We are apparently committed to national policies which will continue this situation in the foreseeable future. The demand for men in industry and the armed forces creates a scarcity of labor on farms, and puts a premium on the efficient use of this important agent of production. In a period when there is a high demand for farm products, the national economy benefits from a large production per farm worker, which also leads to a high level of income for individual farm operators.

The objective of this paper is to show how the product per farm worker may be increased by improving the organization of farming units.[1] To attain this objective, farms may be classified according to the character of the labor supply: (1) farms on which all the labor is supplied by members of the farm family; (2) farms on which there is considerable hired labor. In the first case the labor supply is fixed, and a well balanced unit can be obtained only by adjusting the land and capital to match the labor and management. Land may be provided through purchase or renting. Capital is supplied in the form of livestock, purchased feed, fertilizer, buildings, or machines.

The problem involves not only the proportioning of the land and the capital, but the total amounts of these agents which should be associated with the level of management available for each farm unit. To maximize the net returns from the farm unit, each flexible agent should be added to the point where its net marginal return is zero.

The quantity of land and capital to be added, under a given set of price-cost relationships, will depend upon the ability of the operator to convert inputs into returns. Some farmers get 70 bushels of corn from the same agents of production which are used by other farmers to produce 50

[1] The term "labor efficiency" means the ratio between the amount of available labor and the farm output. Available labor represents the mature male labor equivalent of operator, family, and hired workers who are available for farm work during the year. The term labor input refers to the charge assigned to the available labor force.

bushels. Some farmers produce 100 pounds of hogs from 350 pounds of concentrates, whereas others for the same production use 500 pounds. The higher the rate of conversion, the more land and capital there should be added for each unit of labor available. In those instances where the land area is also fixed, the only opportunity to secure a well balanced unit is by varying the amount of capital.

On farms of the second class, hired labor may be supplied in those amounts which will bring the farm unit into balance. This added degree of freedom simplifies the problem of getting an optimum proportioning of the agents of production.[2] Farmers with a flexible labor supply try to keep the labor input adjusted to the amount of work to be done, whereas farmers with a fixed labor supply try to build up the labor load to match the supply of workers. It is often possible to work out an organization with better balance if land, labor, and capital are all flexible agents of production. It should be recognized that machines and labor may be substituted for each other and it is important to get the best combination, taking into consideration the relative costs and productiveness of the two agents. Since 1940, when prices have been relatively favorable compared to costs, many farmers have been operating below the optimum size of business.[3] The optimum is influenced primarily by two factors: (1) the product price –factor cost ratio and (2) the level of management available. The more favorable the price-cost ratio and the higher the level of management, the larger the volume of inputs per farm should be.

In 1951, farmers are reporting an increasing shortage of workers available for hire. The quality of labor being hired is also inferior. Some farmers who are losing sons or hired men to the Armed Forces are reducing the volume of their business by releasing land or by disposing of livestock, particularly dairy cows. This situation makes it possible for other farmers who have a more adequate labor supply to add land or cows to increase the production per worker on their own farms.

When labor is scarce relative to the other agents of production, it becomes increasingly important that it be used efficiently. Capital, particularly, should be added where it will efficiently replace labor. The government should adopt policies which will make power units, machines,

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[2] It is recognized that under conditions of a short labor supply seasonal workers are difficult to find, therefore an increasing proportion of the workers must be added as full-time, year-round men. This limits the flexibility of labor and the problem is particularly acute for grain, fruit, and vegetable farmers who have a peak labor load during the summer months. Some flexibility in the labor supply is provided by college and high school boys, by exchanging work with neighbors and by custom work which usually involves both labor and machines.

[3] Optimum size of business refers to the quantity of inputs which will maximize the net farm earnings.

equipment, and fertilizer available in adequate supply in order to conserve both labor and land.

Methods of Increasing Labor Efficiency

Labor efficiency may be measured in terms of the annual product per worker. In the analysis of farm records, two types of measures are in general use: (1) man-work units per man, and (2) a labor index based on the labor cost for a particular farm compared to the average cost for farms having similar amounts of work to be done on crops and livestock. Both measures emphasize the ratio between the labor input and the product. The goal is to secure a high level of returns for each month of available labor.

Two methods are available for increasing the productivity of farm workers: (1) lengthen the hours worked per worker; or (2) increase the product per hour of labor. Both methods are used by farmers who attain a high level of efficiency. The change which an individual farmer needs to make, if any, depends upon his particular situation. Some farmers need to work more hours per year, some need to increase the product per hour of labor, and some need to do both.

Methods of Increasing the Hours Worked per Worker

Many farmers apparently do not wish to work enough hours per year to maximize their net earnings. They value leisure more than money. Other farmers would like to work more hours if they could develop an organization which would give an adequate return for the increased labor input. The number of hours which farmers are willing to work may be changed by price-cost relationship or by other conditions. Farmers may be willing to work longer hours when farm earnings are low than when a reasonable standard of living can be earned with fewer hours of work than are necessary to maximize net earnings.

The hours worked per month per worker vary widely over a period of years, as indicated by cost records on cash-grain farms in eastern Illinois. In 1923 farmers in this area were working 251 hours per month of available labor, but as a result of mechanization, a steady decline continued until 1941, when only 190 hours a month were put into the business. As a result of the labor shortage of World War II the hours per month per man increased to 226 and 220 for 1943 and 1944, respectively. In 1947 the average was down again to 184 hours a month.

Farmers in the livestock area of western Illinois worked an average of 216 hours a month in 1948, but there was a wide fluctuation in the hours worked per month by operators and hired men as indicated by the following data.[4]

[4] Data are not available from which to compare the hours worked per month on the cash-grain farms of eastern Illinois with those on the livestock farms of western

Hours per month per worker	*Number of men*
125-150	4
151-175	8
176-200	11
201-225	15
226-250	9
251-275	6
276-300	3
301-over	6

The operators worked, on the average, only nine hours per month more than the hired men. Eight operators worked less than 175 hours a month and five worked over 300 hours. Only one hired man worked more than 250 hours, whereas four worked less than 175 hours a month. These data indicate that there is an opportunity for an appreciable number of farmers to increase the hours worked per month without pushing the input to an unreasonably high level.

The effect of seasonal labor distribution. One of the ways to increase the hours of work per worker is to build an organization which provides a reasonably uniform labor load throughout the year. This involves plans for the cropping system as well as the livestock organization. Other things being equal, the cropping system should provide a uniform demand for labor throughout the growing and harvesting season. There are, however, other considerations more important than labor distribution in choosing a crop pattern. Crops should be grown which have a high comparative advantage in the area. Crop specialty farms are profitable under certain conditions, and in an area which produces a diversity of crops it is important to select a combination of crops which will be most profitable over a period of years. Returns from a cropping system which has a high peak load for labor must be large enough to bear the extra cost of seasonal labor. This situation prevails in many areas for fruit, vegetable, and canning crops.

In many regions of the United States, crops may be classified as cultivated, small grain or nurse crops, and legumes and grasses. Most rotations contain crops from each of these classes, which, if properly selected, will provide for a reasonably good labor distribution throughout the cropping season. Less attention is given by farmers to the labor distribution on crops when the work is done with mechanical power than when animal power is used. Tractors may be used up to 24 hours a day in rush periods, whereas horses can seldom be worked more than 10 hours a day.

Livestock enterprises. Livestock enterprises may be used to create a demand for labor during those portions of the year when there is little work to be done on crops. The livestock farmers of western Illinois and

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Illinois during the same years. It is believed, however, that more hours per month are worked on the livestock than on the grain farms.

their employees worked an average of 32 hours more per month in 1948 than the cash-grain farmers of eastern Illinois did in 1947.[5]

Dairy and poultry enterprises have a high labor input per animal unit and a relatively uniform distribution throughout the year. Hogs, feeder cattle, and feeder lambs may be worked into a farm plan to use labor during slack seasons. The two-litter hog system may be timed so that the pigs are farrowed in the spring before crop work starts and the fall litters come in the slack period of August and early September. Medium and common cattle should be fed during the fall and winter months when the need for crop labor is light.

In a period when farm labor is scarce it is important to use those complementary and supplementary enterprises which will make full use of the labor force available. This applies equally to farms operated largely or entirely with family labor and to those using one or more year-round hired workers.

Flexible jobs. Some work on farms can be done at almost any season of the year and may be classed as flexible labor. Some of these jobs are building fence, repairing and painting buildings, cleaning ditches, and hauling limestone and manure. The efficient manager does this work so that it interferes very little with the crop and livestock labor. In western Illinois in 1948, from 60 to 70 percent of the labor needed to be done at a certain season of the year; this left 30 to 40 percent with a considerable degree of flexibility. The greatest degree of flexibility was found on the feeder cattle-hog farms, and the least on the dairy farms.

Balance between supply of and demand for labor. One of the effective methods of increasing the hours worked per worker is to keep the labor supply relatively low in comparison to the amount of work to be done. Getting the optimum supply of labor calls for careful planning.[6] On farms with a fixed labor supply, land or capital, or both, must be adjusted to the labor to get a proper balance. With a flexible labor supply a part of the adjustment can be made by varying the amount of labor hired. For the State of Illinois in 1946, 80 percent of the labor was furnished by the operators and members of their families and only 20 percent was hired. Although 67 percent of the farms hired some labor, few used large amounts; 39.3 percent hired less than one month of labor; and only 15.8 percent of the farms hiring labor hired at least one full-time, year-round worker, or his equivalent. The relatively small percentage of hired labor limits the extent to which labor is a flexible agent in farm planning and emphasizes the importance of getting the right amounts of land and capital associated with the labor and management.

[5] The difference is thought to be due to the type of farm organization rather than to the change in time.

[6] The optimum supply of labor is that which will maximize net farm earnings.

Methods of Increasing the Product Per Hour of Labor

The following are some of the features of the farm business which, if properly organized, lead to an increased production per hour of labor:

Use of high-producing crop and livestock enterprises. A high output per worker may be facilitated by the use of cropping systems and crop varieties which provide a high level of crop production for the farm. This involves a close adaptation of the cropping system to the quality of soils available. Many farmers fail to have the best balance between cultivated crops, small grain crops, and legumes and grasses or fallow. More errors are made in proportioning the various classes of crops than in the choice of crops to be grown. Too few farmers vary sufficiently the proportion of land in legumes and grasses on the basis of differences in land quality.

The use of high-yielding varieties is also important, since very little more labor is needed to produce and harvest 35 bushels of wheat per acre than 25 bushels. High-quality breeding animals are also important for the same reason. Sows that raise eight pigs per litter instead of six, and cows that have the capacity to produce 10,000 pounds of milk a year instead of 7,000, help to increase the product per worker.

Use of adequate capital. The product per worker may be increased by the use of capital in the form of power, machinery, equipment, and fertilizer. If labor is a scarce agent of production, it is important to substitute capital to conserve it. The most profitable combination is determined by the relative productivities and costs of the two classes of inputs.

The scarcer the labor supply the greater the percentage of large tractors which should be purchased by farmers. A three-plow tractor uses more fuel per acre than a two-plow tractor on light draft jobs such as cultivating row crops, and more fuel per hour on chore labor, but it covers more acres per day per workers on plowing, seed-bed preparation, and other jobs where it can be fully loaded. If labor is scarce and expensive, the extra capital in the form of a more costly machine and higher fuel costs may be justified if it saves enough labor. On farms where additional labor is needed but cannot be hired, it may be desirable to use larger power units in order to utilize the land resources available.

Fertilizer, where needed, may be used to increase the product per worker, and from the national point of view it would seem more logical to increase the supply of fertilizers rather than seek greater production through an increase in the acreage of crops such as cotton, corn, wheat, and soybeans.[7] These crops are now out of balance on many farms relative to the acreage of legumes and grasses.

[7] In an economy where both land and labor are scarce relative to the demand for farm products, a sound national policy should include the allocation of sufficient resources to make available those fertilizers which will be effective in increasing crop production.

Many special machines are available, usually requiring a large capital outlay, which save labor or add to the productivity of labor. The following are examples: cotton pickers, corn pickers, combines, field forage cutters, pick-up balers, mechanical silo unloaders, mechanical barn cleaners, power manure loaders, etc. The cost per unit of work done with machines of this type is high unless a reasonable volume of work is done each year. On small farms it is not profitable to use them unless some custom work can be done. Many farmers solve this problem by exchanging labor and machines with their neighbors. One farmer combines small grains and soybeans for his neighbor in exchange for having his corn husked by the latter, who owns a mechanical corn picker. There is a considerable volume of custom work done by pick-up balers, field forage cutters, and combines.

Scale of operations or size of business. Much has been written about the advantages of small machines that are adapted to small farms. From the standpoint of labor economy, however, large machines save more labor than small ones.

Under central Illinois conditions, farm account records indicate that the product per worker is greater on large farms than on small ones. This is true whether size is measured in acres per farm or by total annual inputs per farm. On grain farms total returns per month of labor increased from $646 to a high of $1,079 as annual inputs increased from $7,000 to $27,360 per farm in 1949. There was a decline, however, for the next two larger size groups. On hog farms there was a steady increase in total returns per month of labor, as annual inputs increased from $6,252 to $43,289 per farm (Table I). Comparable relationships are shown by net returns per month of labor and by net returns per $100 of the total inputs. Doubling the charge for capital did not alter the conclusions. Similar results were also obtained from 1950 records. Under Corn Belt conditions and with 1949-1950 price-cost relationship, the product per worker could be materially enlarged by increasing the average size of the farm business.[8]

A well-planned farmstead. Mechanization of agriculture has increased the percentage of the time which farmers work at the farmstead. In western Illinois in 1948 farmers spent the following percentages of their time at work on crops: grain farms, 36 percent; feeder cattle-hog farms, 25 percent; and dairy-hog farms 16 percent. Thus from 64 to 84 percent of the time was spent on livestock and general maintenance work. Much of the non-crop labor is performed at the farmstead. These data indicate clearly the importance of arranging and equipping the farmstead to save labor. The following are some of the important ideas to be considered:

A small farmstead. It is cheaper to carry the additional fire insurance

[8] This is true only to the extent that the level of management found on accounting farms can be duplicated on other farms. A portion of the higher net return per worker on the larger farms may have been due to the presence of better management on the large than on the small units.

TABLE I. RELATIONSHIP BETWEEN TOTAL INPUTS PER FARM AND TOTAL AND NET RETURNS PER MONTH OF LABOR, HOG AND GRAIN FARMS, CENTRAL ILLINOIS, 1949

Items	Total Annual Inputs per Farm							
	$4,000 7,999	$8,000 11,999	$12,000 15,999	$16,000 19,999	$20,000 23,999	$24,000 27,999	$28,000 31,999	$32,000 & over
Hog Farms								
No. of farms	4	42	40	70	44	13	11	22
Acres per farm	100	173	212	261	307	336	349	417
Total returns per farm	$5,957	$11,824	$15,829	$21,041	$25,195	$32,364	$36,390	$50,009
Net management returns	−294	797	1,196	2,543	2,773	5,318	5,339	6,721
Months of labor	12	16	20	23	25	30	33	38
Labor cost	$1,747	$2,409	$2,967	$3,469	$3,901	$4,663	$5,195	$6,069
Machinery cost	1,227	2,407	2,970	3,542	4,342	4,878	5,018	6,616
Total returns per month of labor	514	728	802	901	1,000	1,093	1,095	1,334
Net returns per month of labor	−25	49	61	109	110	180	161	179
Net returns per $100 inputs	−5	7	8	14	12	20	17	16
Grain Farms								
No. of farms	10	62	51	50	24	8	12	10
Acres per farm	130	213	289	356	448	448	645	687
Total returns per farm	$7,732	$12,638	$17,454	$23,143	$27,767	$32,782	$42,294	$45,424
Net management returns	732	2,064	2,674	4,539	5,123	5,422	10,764	5,952
Months of labor	12	14	21	26	28	30	40	48
Labor cost	$1,800	$2,122	$3,092	$3,741	$4,427	$4,746	$5,911	$7,931
Machinery cost	1,487	2,473	3,341	4,314	4,859	6,287	7,574	8,050
Total returns per month of labor	646	883	820	907	992	1,079	1,065	944
Net returns per month of labor	61	144	126	178	183	178	271	125
Net returns per $100 inputs	10	20	18	24	23	20	34	15

and risk on a compact group of buildings, than to scatter the buildings over a large area, thereby increasing the distances which must be traveled several times daily, and the cost of moving feeds from storage to livestock.

Buildings around a court. Buildings properly arranged around an open court permit workers to gain access to all buildings with a minimum of travel and without opening gates or crossing muddy lots.

Feed supply adjacent to livestock. The feed storage should be arranged so that the feed can be moved to the livestock with a minimum of effort. Hay and grain storage on beef cattle and hog farms should be convenient to feeding floors. Some farmers have their grain storage so organized that corn can be moved without scooping from the crib into the grinder, from which it is blown into self-feeders or elevated to overhead bins and thence lowered by gravity into the feed bunks.

The Agricultural Engineering Department at the University of Illinois is now operating some research units on which the grinding of feed is completely automatic. The operator pushes a button to start the operation and the machinery is automatically turned off when the grinding is completed. Dairy barns can be constructed or remodeled, and equipped to save an appreciable percentage of the normal labor need.

Machine storage convenient to the fields. The machine storage should be located near the lane which leads from the farmstead to fields. The structure should be designed so that machines can be pulled by the tractors into and from storage.

Farm work simplification. There are principles of efficient labor use which can be applied to each farm enterprise and to each farm task. This is an important phase of increasing the product per worker which will be discussed in the paper which follows.

Measuring the Amount of Labor Needed

Farm records are useful in estimating the amount of labor needed for a farm. Two methods have proved of value.

Standards from detailed cost records. Detailed cost records, where available, furnish data on average hours of labor for crop and livestock enterprises. The amount of labor needed for a particular farm may be calculated by multiplying the standard input per unit by the number of units of work to be done. Since the seasonal distribution of the labor is also available, it is possible to calculate the labor load by months or by seasons.

The following precautions should be observed. The standards will vary by areas depending upon the average size of the fields, the scale of livestock enterprises, the type of power and machinery employed, and the production practices followed. Standards are therefore needed on a system-of-farming or a type-of-farming area basis. In Illinois the detailed cost project is moved from area to area each second year and the records are analyzed by systems of farming.

An adjustment should also be made for varying levels of management. As pointed out earlier, there is a wide variation in the number of hours worked per worker. Thus the operator who has a well-organized farm, on which 275 hours of work are performed per man per month, will need fewer workers than the operator who secures an input of only 200 hours a month from each worker. This variation should be recognized in farm planning or budget analysis when calculating the number of men needed to perform a given amount of work.

Standard labor charges from farm financial records. Farm financial and production records may be used to calculate flexible labor standards. The labor expense for a farm may be compared with the average expense on other farms having similar amounts of work to be done on crops and on livestock. This approach to the problem is most helpful in the analysis of the records for individual farms. The flexible standards, as measured by the labor index, indicate the degree to which labor costs are above or below the average for other farms having similar amounts of work to be done. They do not indicate optimum labor inputs. They do, however, establish the level of labor inputs on farms where labor is used most efficently. These high level standards indicate for most farmers a goal which, if achieved, would materially increase the product per worker.

The Influence of Labor Efficiency on Earnings

The gross relationship between labor efficiency and farm earnings is demonstrated by the analysis of 265 farm records in four central Illinois counties for the period 1944-1946. The 53 farms with the lowest labor

costs in proportion to the amount of work to be done had labor inputs only 73 percent as high as the average for all farms; whereas the 53 farms with the highest labor costs had labor inputs 125 percent of average.[9] The average labor costs per farm were $2,133 and $3,532, respectively.

Other characteristics of the two groups are as follows:[10]

	53 farms with low labor costs	53 farms with high labor costs
Labor cost per farm	$2,133	$3,532
Percent of average cost	73	125
Acres per farm	289	289
Value of feed fed per acre	$ 27	$ 23
Value of crops produced from tillable land (Index)	102	102
Returns from productive livestock (Index)	100	98
Power and machinery cost per farm	$2,196	$2,234
Percent of average cost	91	95
Rate earned on investment (percent)	16.9	13.1
Operator's labor earnings	$8,367	$6,374

It is not claimed that all of the differences in earnings were due to labor efficiency alone, but that labor efficiency contributed to the difference. The data indicate that 53 farmers had more production with $2,133 worth of labor than 53 other farmers did with $3,532 worth of labor. There is no evidence that the production per acre or per animal was less because of the lowered labor cost. Power and machinery use was also more efficient on the low-labor-cost farms. These records do not indicate that the 53 farms most efficient in labor use had optimum labor inputs. Their labor input was nearer the economic optimum, as previously defined, and their product per worker was considerably above the average for other accounting farmers. Research and farm accounting have not yet developed to the point where it is possible to measure the optimum input of labor on individual farms. The principles involved are clear, however, and flexible standards can be developed from farm records which are helpful in indicating approximately the amounts of labor needed on a farm for a high level of returns per unit of labor used. It is likely that more consideration will be given to methods of increasing labor efficiency in the future than has been given in the past.

[9] A uniform rate was charged for each month of available operator's and family labor. Hired workers were charged at the cash rate plus the value of perquisites.

[10] M. L. Mosher, W. D. Buddemeier and others, *Three-Year Report on 265 Farms in the Pioneer Farm Bureau Farm Management Service for 1944, 1945, and 1946;* University of Illinois, College of Agriculture, AE2476, Table 13, page 25.

INCREASING LABOR EFFICIENCY ON INDIVIDUAL FARM ENTERPRISES

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INCREASING the efficiency of farm labor is generally assumed to be a good thing. We must recognize before accepting this assumption that some producers have already exceeded the point of greatest net revenue in search of more and more labor efficiency.[1] An increase in output of labor, to the particular firm, is a good thing if an increase in the resulting value productivity is greater than the cost of securing it. In this paper we shall be concerned with accomplishment of economic reduction in labor requirements for any and all enterprises on particular farms. Ways in which economic research can contribute to that end will be the dominating purpose of this discussion.

The method to be used in exploring the problem of this paper will be to present: (1) the need for greater research emphasis in the general study area, (2) a general classification of ways to improve labor efficiency, (3) the conditions for economic validity to the problem solution, (4) the progress made in labor efficiency, and (5) areas of needed research.

A recent development of importance in labor efficiency studies has been the adaptation to agriculture of time and motion studies, which are nationally recognized as causing significant changes in labor utilization. So far, these studies have been concerned mostly with the technical phases of farm work methods.[2] The type of data obtainable by the work simplification research technique[3] is suited to determination of marginal value productivities of farm labor and of equipment capital, and to the determi-

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* G. B. Byers and G. L. Johnson, my colleagues, have made helpful suggestions in the preparation of this paper.

[1] Labor efficiency can be most conveniently defined as the ratio of the labor input to its output. Improvement in this ratio, like other production concepts, is subject to the laws of diminishing product.

[2] This was an urgent need in 1942 when the national program began. "The functional approach to effective farm labor utilization is to assume that the land resource pattern is set and the decisions regarding general farm organization are made. Thus it is limited to the problem of how to perform the necessary work." L. S. Hardin, "The Functional Approach to Effective Farm Labor Utilization," *this Journal* XXXI:382-384, 1949. Work simplification research is defined as ". . . the systematic analysis of work methods by which the easiest, most effective and economical way to do a job is searched out, developed, and put into use." L. S. Hardin and R. M. Carter, "An Analysis of Work Simplification Research Methods and Results," *this Journal* XXVII: 320-330, 1946.

[3] L. M. Vaughan and L. S. Hardin, *Farm Work Simplification*. New York, John Wiley and Sons, Inc. 1949.

nation of the rates of substitution of capital for labor in specific employments. This should become apparent in the subsequent discussion.

An increase in the physical productivity of farm labor is desirable: (1) to bring about a greater total farm production without increasing the supply of farm laborers or (2) so that, competitively, returns to labor will be sufficient to keep laborers on the farms for the necessary production, or (3) to increase the amount of leisure time for farm laborers (entrepreneurs included). Greater total production is easily an important point because of the potential needs of an accelerated program of national defense and an increasing population. The second objective is a felt need because the prices of farm labor have risen, forcing farmers to bid for labor through greater efficiency. Demands for manpower in the Armed Forces and industrial production have contributed to a felt shortage.[4] It is generally believed that these recurring labor shortages must be met with increases in labor saving methods at the enterprise level. The third objective is in line with the rest of the economy which experiences more leisure time. A preference for more leisure as an objctive by an entrepreneur is perfectly justifiable in normal peace time.

The output of labor at the enterprise level may be increased in one or a combination of three ways: (1) Biological innovations which increase the output of the basic producing resource also increase labor productivity; e.g., crop and animal breeding, fertilizer experimentation, disease, weed, and insect control, etc. The effect of increasing output in this manner is to increase the marginal productivities of all the agents contributing to the product produced. Labor as an agent benefits by such innovations. Much of the increase in labor efficiency originates in this way. This paper will not be concerned with this aspect of labor efficiency except to note its effects. (2) Mechanical innovations and reorganization of work processes increase the output of labor (reduce labor requirements).[5] Mechanical innovations may be considered as substitution of capital for labor, while reorganization of the work processes involves an appraisal of the methods used, sequence of operations, time intervals, etc., and their rearrangement with little or no capital additions. The economic problems of capital substitution and work process reorganization are the main concern of this paper. (3) Enterprise recombination may increase the over-all output of farm labor by reducing the labor underemployment caused by seasonal needs and variation of these needs within and between seasons. Enterprise combination was discussed in the previous paper.

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[4] Much of the felt shortage may be due to farmers' unwillingness to pay the increased prices of farm labor. Currently, the ratio of prices received by farmers to wage rates paid to farm laborers is only 65 percent of the 1910-14 ratio.

[5] These two methods are combined because of their usual complementary relationship.

Students of labor utilization problems may be inclined to add scale efficiency as another way to improve labor productivity. Scale of enterprise in relation to the most fixed resources (land and buildings) is a major cause of the variation of labor output between farms having similar production equipment or farms producing at a similar output rate. Therefore, scale efficiency is involved in all of the above.

For solutions to the problems of labor efficiency, three conditions must hold for economic validity: (1) The hours of labor on each farm should be distributed among the enterprises so that their (discounted) marginal value productivities will be equal in all uses, consistent with the state of knowledge and with an economic appraisal of the obstacles to any other arrangements. This should be true: (a) between enterprises on a particular farm, (b) between farms, and (c) between agriculture and industry. (2) The marginal cost of labor or capital should not exceed the (discounted) marginal value productivity of the labor or the capital. (3) The incremental income gained from a change should be enough to outweigh the sacrifice of leisure[6] necessary to gain it.[7]

Progress Made in Labor Efficiency

The working force of agriculture is made up of about 11 million workers, of whom slightly more than three fourths are family workers. This force spends approximately 19 billion hours annually in the production of the total agricultural product. Five enterprises consume slightly over 60 percent of the total hours of labor spent on farms. For the period 1945-48 the rank of the five enterprises in amount of labor used was: milk cows, corn, cotton, poultry, and tobacco.[8] Excepting corn all are considered as labor-consuming enterprises.

Nearly all farm crops except potatoes and tobacco are now produced with less labor per acre than several decades ago. Compared to 1910-14, the production per man-hour of labor is at least 200 percent greater in food grains, 100 percent greater in feed grains, 75 percent greater in fruit and tree nuts, 50 percent greater in truck crops and cotton, and 50 percent greater in milk and poultry products.[9] The increase in productivity of

[6] Sacrifice in leisure as used here is more than a unit of time given up; it also refers to discomfort, weariness, hardness of work, etc.

[7] This third condition, admittedly, is a subjective one and imposes a restriction which, quantitatively, is difficult to appraise. However, our democratic system requires this prerequisite for individual behavior. The costs of hired services are outlays of money, but the costs of the services provided by the entrepreneur and his family may be the sacrifice made (opportunity costs of cash and subjective nature) to furnish the labor. These costs are called "real costs" by F. M. Taylor. He points out that they are the determinants in fixing the supply price for labor. *Principles of Economics*. 9th ed. New York, Ronald Press Co. 1925, p. 318.

[8] R. W. Hecht and Glen T. Barton, *Gains in Productivity of Farm Labor*, USDA Tech. Bul. 1020. 1950, p. 88.

[9] *Ibid.*, p. 61.

labor used in crop production is about twice the increase occurring with all meat animals and animal products. Corn and wheat production efficiency lead in the field of cereals, and milk products lead in the list of livestock enterprises. These increases are understandable when one considers that during the 10 years 1940-49 the number of tractors and motor trucks more than doubled, that of grain combines and corn pickers trebled, and the number of milking machine quadrupled.[10] During the same period, the volume of farm power and machinery increased 58 percent[11] Relative to manufacturing and mining, agriculture has kept pace in production per worker since the depression of the thirties.

Actually, the fact that agriculture has kept pace with manufacturing and mining for the past two decades is nothing to be proud of. In agriculture, increases have come in crop and livestock yields, in use of labor-saving machinery, and in improved organization of the work processes. On the other hand, most of the richest mines have been mined, and the raw product of manufacture needs more processing. Therefore, it is more correct to say that output of labor in agriculture has lagged when the effect of biological innovations is removed. Only in corn and the small grains of the crop enterprises, and in dairying of the livestock enterprises, have great strides been made in labor-saving due to mechanical innovations. Several others of the crop enterprises, primarily hay, probably will show great advances when the present knowledge is more widely adopted. Much has been heard about mechanization in cotton production. The latest available synthesized figures show that two thirds of the increase in output from labor in cotton comes from increased yields. Livestock production resists mechanization and work-process reorganization more than any other of the enterprises, due to the percentage of the total production made up of small scale operators and the existing rigidity in storage and feeding structures.[12]

The slowness of agriculture to adopt more efficient methods is more apparent when we consider that many of the services attending the major enterprises have been assumed by groups other than farmers. Many services which were originally included in the labor requirements are no longer done by farmers, such as shelling corn, transportation of product to market, feed processing, home food production and many, many others.

Farmers are slow to adopt labor-saving methods because uncertainty of

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[10] U.S.D.A., Bur. Agr. Econ., *Farm Production Practices, Costs and Returns.* (Mimeo) Statistical Bul. 83, 1949, p. 44.

[11] *Ibid.*, p. 49.

[12] Livestock differs from crops in that daily care and inspection is a requisite for good management. Consequently, even though labor requirements are reduced to insignificant amounts (automatic feeders and waterers), the above task, properly done, will require daily time. Actually time used in care and inspection should be charged to management.

future needs for labor causes them to keep a surplus of farm labor on hand—or the opposite, which is to plan production so that labor will not be fully employed all the time. A farmer who has a surplus supply of labor most of the time will be only moderately interested in improving the efficiency of his workers. Under these conditions big gains in labor saving methods are not made unless labor is in short supply.

This resistance among farmers to the adoption of labor-saving methods is quite obvious when the difference is noted between the actual output of labor and what farm work simplification studies throughout the United States show to be possible. For example, studies at Purdue University showed that the labor needs for hogs can be reduced about 60 percent,[13] and that the average tomato picker can increase his output 16 to 20 percent.[14] Similar studies at the University of Kentucky showed that the amount of labor to produce one acre of tobacco can be reduced 30 percent,[15] and that the annual man labor requirement for dairying in a stanchion type barn can be reduced about 50 percent.[16] Recent studies at Mississippi State College indicate that due to the advances in cotton mechanization and weed control, labor requirements in cotton may be reduced from the present 182 hours per bale to within the range of 20 and 30 in five to 10 years.[17] From the work simplification studies it seems safe to generalize that a reduction of 20 to 30 percent in labor requirements may be accomplished through improvement of the work methods and with moderate increases in capital. Why is the gap between the actual and possible so great?[18]

Areas of Needed Research

As indicated earlier, the thread of continuity in this paper is the way that economic research can contribute to the general problem of increasing labor productivity at the enterprise level. Four important areas of needed research are noted in the following discussion.

1. An important area of research is in determining the value productivities of different labor operations which affect the quantity or sale value of a given product.[19] Suppose a farmer is forced to operate

[13] Vaughan and Hardin. *op. cit.*, p. 17.
[14] *Ibid.*, p. 29.
[15] *Ibid.*, p. 26.
[16] *Work Simplification Newsletter*, Issue No. 20. Purdue Work Simplification Laboratory, Lafayette, Indiana, August 1949, p. 9.
[17] Frank J. Welch and D. Gray Miley. Cotton Labor Requirements, *this Journal* (Proceedings) XXXII:752-758, 1950.
[18] It is highly probable that if these studies were reported in terms of value productivities of labor and capital inputs or the substitution rates of capital for labor, some of the reasons would be more apparent. The relationships between marginal and average responses and costs would be clarified.
[19] This classification is for those labor operations in which capital costs do not exist or are not important.

with less labor than formerly, from what enterprise will he take the labor? Or, as is frequently true, if he has extra labor, where will he direct it to get the greatest returns? The ways he can adjust are: (a) reduce or add production units, e.g., acres of corn, number of cows, etc., or (b) eliminate, add, or substitute operations connected with going production units according to their relative marginal value productivities. This latter type of adjustment is meant to be considered within a framework in which (1) all job operations and idle time have been previously eliminated that would not affect the quantity or sale value of the product,[20] and in which (2) the hours of labor are so distributed that their marginal value productivities are equal in all uses.[21] The research in this study area would involve measurement of changes in the product with changes in labor inputs.[22]

2. Before a farmer can decide about the most profitable ratio of capital to labor, he must have some knowledge of their rates of substitution and their costs.[23] The work-simplification technique is easily adaptable to securing these important economic data. It is a technique which measures accurately and minutely the input of labor for each small segment of a farm job, with and without capital additions. Given the capital requirement, the physical product, and the labor input (minutely measured) for a series of capital improvements, the analyst can easily and quickly compute the changes in the productivities of both labor and capital. For example, assume a 20-cow dairy barn in which 130 hours per cow are required, total investment in dairy barn and equipment is $5,800, with an annual capital cost of approximately $480 and the following conditions are true: a four-cow milking parlor of the walk-in and back-out type, and milk room, electricity, running water, hot water heater and milk cooler, hand milking, and equipment so located and work routine so planned that no reduction in labor requirements would occur by rearrangement.[24] Now

[20] Elimination of such operations and idle time is an important aspect of enterprise management which should be done irrespective of the costs of the factors, or the prices of the product. The research economist interested in maximizing net revenue through the use of marginal analysis is primarily interested in factor costs, rates of substitution between factors to produce a given product, output changes with an incremental change in input, and product prices. Consequently, marginal analysis does not tolerate labor expenditure which fails to produce a product.

[21] For a more complete statement see the conditions for economic validity as stated earlier.

[22] As an example such a study see: G. B. Byers, C. E. Bortner, and W. B. Back, *Effect of Maturity and Priming of Burley Tobacco on Yield, Quality and Labor Requirements of the Crop*. Ky. Agr. Exp. Sta. Bul. 552. 1950.

[23] As stated earlier, the decision to purchase a piece of labor-saving equipment is frequently made for other reasons. However, some few (the first ones), give careful thought to the marginal productivities of additional or substitute investments. Once decided by these few, the innovation is accepted as generally good.

[24] Adapted from unpublished work simplification data provided by George B. Byers, Kentucky Agricultural Experiment Station.

let us add, separately, three items of capital cost and note the consequences on the dairy system. If an efficiently operated two-unit milker is added to replace the milking by hand, the operator will add $330 to his investment, or $43 to his annual capital cost, and he will reduce the total yearly labor requirements 828 hours; for each dollar of added annual capital cost, labor requirements will be reduced 19.2 hours. If the operator spends $60 more to add an overhead feeding arrangement, he will add $6 to his annual capital cost, reduce the total yearly labor requirements 73 hours, and for each additional dollar of annual cost, labor requirements will be reduced 12.1 hours. If the operator spends $110 more for doors in front of the cows to make a walk-through parlor, he will add $11 to his annual capital cost, reduce total yearly labor requirements 59 hours and for each additional dollar of annual cost, labor requirements will be reduced 5.4 hours. This type of information, presenting an array of capital items for different levels of herd size (10 cows, 20 cows, 30 cows, etc.)[25] will provide entrepreneurs with sufficiently accurate information to determine the optimum ratio of capital to labor, irrespective of whether the optimum has to be determined within a capital rationing framework, or over a specific length-of-run, or in disregard of these.

In another study, data secured by the work-simplification technique showed the effect on labor cost when barns and equipment were considered as fixed (constant for any change) and the size of herd using the facilities is changed. Assuming a barn and equipment for a 20-cow barn, Wells calculated labor requirements at different levels of herd size (10, 15, 20, 25, and 30 cows).[26] This was done by reconstructing in detail all the jobs attending each of five possible herd sizes (size of barn constant) and for each herd size using six different levels of roughage-concentrate ratios. For example, it was found that when 80 percent of the TDN were supplied by roughage, the annual labor costs per cow for the herds of 10, 15, 20, 25, and 30 cow size were $58, $48, $44, $42, and $40 respectively.

It may be worth-while to point out that much of the capital for labor-saving equipment is borrowed. In this sense the capital improvement must be profitable enough to assure lenders that such improvements are sound investments. For this reason, studies of the physical productivities of capital costs (labor-saving) should also be concerned with capital rationing, length-of-run for the new capital,[27] and possible scale changes due

[25] Scale of housing structures adjusted to optimum for each herd size.

[26] James A. Wells. "A Technique for Synthesizing Cost of Production Data—with special reference to dairy enterprises in Green and Taylor Counties of Kentucky" (Unpublished Thesis) University of Kentucky, Lexington, Kentucky 1951. For the 25- and 30-cow herd, housing space for the additional cows was assumed to be within 100 yards of the dairy barn. All cows were assumed to be milked in the dairy barn.

[27] It may be necessary to take short-run losses to realize long-run gains. In this case the knowledge must be generally known.

to labor efficiencies (these may be a direct result of labor-saving equipment).

3. The third area where further research at the enterprise level would be fruitful is that of securing a more complete understanding of the obstacles which stand in the way of the adoption of labor-saving equipment and methods. Such information would be essential if the time should come when action on a national scale would be needed to secure greater efficiency of labor utilization at the enterprise level. Perhaps such knowledge is more important to the formulators of voluntary action programs. Entrepreneural decisions, more frequently than not, must account for at least six main groups of obstacles.[28] They are:

(1) rigidities in the existing production equipment,[29]
(2) ignorance about existing technology,
(3) inelastic attitude toward a different way,
(4) imperfect knowledge about future events, such as weather, prices, development of new labor-saving machines, and governmental policy,
(5) the ratio of owned to borrowed capital,
(6) preferences for leisure.

Intensive studies in these areas have a high probability of revealing some new views on labor efficiency. Basically, such studies would be concerned mostly with entrepreneurship. This in itself is a field of study which has not commanded sufficient thought by farm economists.

4. A fourth area of possible research in labor efficiency studies at the enterprise level is to determine the intra- and inter-enterprise effects of labor-saving innovations on enterprise adjustments within farms and between farming regions. As a general rule, conditioned by the aforementioned rigidities, an increase in the marginal productivity of labor in an enterprise relative to other enterprises as caused by a labor-saving innovation will motivate the entrepreneur to shift more of his labor resources to the favored enterprise. The same would be true if we were discussing regions instead of farms. Consider, for example, the effects of a labor-saving innovation that would decrease the labor requirements at least 40 hours annually, with only small capital costs, to care for and milk a dairy cow. Consider, first, the effects on the enterprise structure of farms adopting the labor-saving innovation; second, the effects on the regions most adaptable for use of the innovation; and third, the ultimate effect on the

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[28] It is easy to see that these overlap. However, they are detailed for their marginal worth as ideas.

[29] The number and arrangement of stanchions in a dairy barn on most farms automatically fix the degree of labor efficiency as affected by scale of enterprise and routine of operations. Even though studies may show that making the changes is highly profitable, the entrepreneur still holds back.

supply curve of the dairy industry. Such studies will lead directly into supply curves, alternative uses of resources, and different lengths-of-run.

In this connection, it is safe to predict that progress in development of labor-saving innovations will continue. Concurrently, the productivity of labor will also change, not proportionately the same for all farms and for all regions, but disproportionately; which, in a nutshell, means that the optimum use of a farmer's labor will be constantly changing. All these considerations seem to emphasize that economic research in labor utilization is needed: (1) to ascertain the relative importance of a change in labor requirements to the supply schedule of particular farms, and (2) to estimate the effects on substitute and complementary enterprises within and among farming regions.

The work simplification technique, complemented by regular research methods, is a promising means for greatly expanding our knowledge about labor efficiency, with the result that we can more accurately anticipate the problems of an ever-changing agriculture. Expansion of research in the field of labor utilization, especially in the area of fundamental problems, is a great need.

INCREASING LABOR EFFICIENCY THROUGH WORKER TRAINING AND IMPROVED LABOR RELATIONS

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WE HAVE had excellent discussions by Mr. Johnston and Mr. Nesius of the values resulting from good farm organization, and from improved work methods for specific farm jobs. It is my assignment to carry the subject one step further—by considering what some people like to call the "human" aspects of labor efficiency.

First, let us clarify what we mean by "worker training" and "improved labor relations" in agriculture. This can be done best by contrasting the nature of these terms in industry with that in agriculture.

In industry, worker training and labor relations are given specific identity. Specially trained personnel are assigned to develop educational programs. Large numbers of workers are involved for any one management. Most workers have specialized trades. Labor organizations speak for the workers in their dealings with management. Worker training and labor relations are an accepted part of employment conditions.

On the other hand, on most farms worker training and labor relations are an informal part of regular farm activities. They have little identity as such, but become very important for several reasons. For example, when a farmer has but one or two regular hired workers, what each person does represents a high proportion of the total work accomplished on the farm. On seasonal jobs which last only a few weeks, it is important to reach a high rate of productivity as early in the working period as possible. This small regularly employed labor force for any one operator, and the high seasonal labor load of short duration are major characteristics of farming.

It is also true in farming that the lines between management and labor practically disappear. The operator of a farm is as much a worker as a manager or a foreman. Members of the family work with or in the place of hired help. A regular hired man may become the foreman of a work crew during the period of seasonal work. Relationships are close and job assignments quite flexible in farming.

Within the framework of this farm setting, it is the intent of this paper to discuss informally some of the things that the Extension Service or the farmer, or both, can do to increase labor efficiency by giving more attention to worker training and labor relations. Essentially, this is merely giving proper recognition to the fact that the amount of output which a properly qualified worker can produce on a given job depends primarily upon four things:

1. The *method* which he uses, i.e., the way the work is done, the use of his hands and body, the arrangement of what he uses, the kind of equipment he employs.
2. His *skill* in using the method, i.e., his proficiency at following a given method, largely a matter of natural ability but influenced by experience or practice.
3. The *effort* which he exerts, i.e., his will to work, influenced by his physical condition, how he feels, interest in his work, mental attitude.
4. The *conditions* under which he works; i.e., his surroundings, light, heat, ventilation, and other similar environmental factors.

Improving Work Methods

Most farmers have grown up with the business. They have learned how to do their work primarily by trial and error—through practice and experience. Instruction, when given, has been in accordance with existing methods used by the farmer. Often these methods are based on limited observation, usually confined to a few farms.

While most farmers are looking for new ideas, what they observe at meetings and on trips to other farms has to do largely with new varieties, new practices or new equipment. There is not much opportunity for one farmer to observe the methods of other farmers in doing their work. Cows are being milked, apples are being picked, and hay is being harvested on neighboring farms at the same time. It is difficult to observe others when you are busy harvesting your own crop.

Through the use of motion pictures, publications, slides, and exhibits, farmers may realize perhaps for the first time that the same job is being done in many ways. Some methods must be better than others. A realization of these differences in methods paves the way for assistance in developing a new way to perform an old job. Until you have helped a farmer improve his own work—until he himself has become "work conscious," he is not likely to become interested in instructing others.

It is not easy to bring about a change in the well-established method of a person who has developed his present work pattern from long years of experience. There must be real reasons for a change. Savings must be substantial, and attainable by the average person.

In the tobacco series developed in Kentucky, *Easier Ways To Do Farm Work*,[1] each operation was studied and instruction pamphlets prepared to show the savings, explain the changes, and describe the new methods step by step. This included illustrations of small pieces of equipment to be used with the improved method.

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[1] Extension Leaflets 75, 76, 79, 84, 86, 90, 92, 103. Univ. of Ky. 1944-45.

In the Vermont publication, *Modern Milking Methods,*[2] a similar approach was followed, giving the reasons for each step in the improved method and how to change over from the existing method.

Generally speaking, in our extension program we have not given enough attention to the work aspects of a new practice and have not answered the questions that arise when a farmer tries to introduce the practice into his work routine. Time will not permit going further on this point. The reason for bringing it into this discussion is to establish the need for some contact with the farmer on his own work prior to helping him in the instruction of others.

Training in "How To Instruct"

It is no criticism of anyone to say that a person who knows well how to do a job often makes a poor instructor. Usually familiarity with a job causes one to overlook the points that may be most important to the inexperienced person.

There is no better way to help farmers realize what is necessary in giving instruction than to have them participate in a Job Instruction Training (J.I.T.) course,[3] similar to that used in industry. In this training a person is given practice in how to break down a job for instruction purposes–how to get the important steps clearly in mind–how to select the key points that need special emphasis. A participant would also get practice in actual instruction–how to get a man to do a job correctly, quickly, conscientiously–how to prepare a man to do a job–how to present the job–how to help him try it out under supervision–and when to put him on his own.

Except during labor shortages, and even then on a very small scale, farmers have not been given much assistance in how to instruct. And yet there is probably no job on a farm performed more frequently than that of giving instruction to others. The operator of a farm must instruct members of the family and regular hired help. Most of the instruction of seasonal farm workers will be done by the farmer, a member of his family, or some of the regularly employed hired help.

Real progress in the training of seasonal workers can be made by working with the farmer on how to instruct, along with assisting him in improving his work methods. Some good examples of publications used with farmers in helping them with their training problems are:

Training Employees for Farm Work–Bulletin 646, Cornell Univ., May 1944.
Pulling, Piling, Topping and Loading Sugar Beets–A Labor Training Manual Bulletin 235, Montana State College, September 1945.
Making the Most of the New Farm Worker, FL 37, Iowa State College, 1942.

[2] Circular 111, Agr. Ext. Serv., Univ. of Vt., Nov. 1944.
[3] Extension Farm Labor Circular 28, U.S.D.A., March 1945.

Instructing Seasonal Workers

Considerable assistance can be given in the instruction of seasonal workers by the Extension Service through the preparation of job instruction leaflets, by working with the foremen and crew leaders, and by giving actual instruction to workers located in labor camps. In the preparation of leaflets or other visual aids to be used, it is desirable to work out the methods to be taught with the local growers, in order that they may be generally acceptable in the area. The series used in Michigan were developed in this way.[4] The style is specific and direct—sentences are kept short—words are simple and easily understood. The purpose is clearly stated and personalized—for example, "you can earn more money—make the job easier—do better work." Every step or key point is pictured as well as described. The pamphlets are printed in pocket size on good quality heavy paper.

The best approach to the training of many workers is through the foreman or crew leader. Training courses for foremen, both in job instruction (JIT) and job relations (JRT), as used in industry, can be applied effectively to agriculture. A start was made during the Extension Farm Labor Program, 1943-47. Some results from that period show clearly that instruction pays off.

In November 1946 in Tulare County, California, during the cotton harvest, a test was run on Mexicans by the county farm labor office to determine the effectiveness of good training. Two groups of Mexicans were selected and put to work in the same cotton field under similar conditions. Group A, composed of 20 workers, was given excellent instruction, in Spanish. Group B, composed of 19 workers, was set to its task by the grower's experienced foreman. Neither group contained any individuals who had ever picked cotton before. Both groups were made up of representative members of a labor camp. Group A the first day picked an average of 21 pounds of cotton per hour. Group B averaged 15 pounds per hour. The group with good training was approximately 30 percent more productive than the group handled in the traditional fashion.[5]

It may be that by the end of a season, many workers will have greatly improved their output with or without instruction. But what a person can do at the end of the season is not as important as what he can do at the beginning and throughout the relatively short work period.

Another example of what proper instruction can do for inexperienced

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[4] Extension folders F 90, 91, 92, 94, 95, 96, 101, 103, 104, 105; Michigan State College, 1946.

[5] *The Farmer and His Help*—Extension Bul. 683, Oregon State College, October 1947.

workers is provided by an Indiana experiment. Based upon work simplification studies of expert tomato peelers, a new method of peeling tomatoes was developed. Its effectiveness was tested under actual factory conditions.[6]

A controlled experiment was conducted in which 20 peelers were paired according to previous output and experience in peeling. Ten peelers, one member of each pair, were trained in the use of the new method; the remaining 10 were used as a control group. Only the trainees who had no previous peeling experience showed a substantial increase in output over the workers who had no instruction in the new method. The inexperienced group reached a peak during the fourth week 30 percent higher than the level of the control group, and over the entire period an average increase of 20 percent compared with that of the control group.

The instructed workers who had previous peeling experience reacted quite differently to the new method. As a group they barely reached their old level of accomplishment. Since these workers seemed so accustomed to the old method which they had been using, it was hard for them to learn a new one and forget the old in such a short period of time.

This experiment gives us information of real significance in regard to instruction for seasonal workers. In many instances the skill already developed in the use of a particular method may appear more important to the worker than the advantages of a new method. Under actual working conditions, the reduction in output during the learning period may reduce earnings to a point at which it is more profitable to continue the old method than to learn a new one. This is particularly true on a job that lasts for a relatively short time. Many of our seasonal farm jobs are of short duration.

Certainly new workers who must learn how to do a job should be given the benefit of the best work methods that are known or can be developed at the time. To train a worker in less effective methods is to deny him 16 to 25 percent of his potential income—when he works on a piece rate. Good instruction also helps the farmer, because it tends to improve the quality of products, and reduces wastage of materials, damage to equipment, and accidents to persons.

Improving Farmer-Worker Relations

It is easy to become overenthusiastic on the importance of a work method in explaining the differences in output of various persons. Observation will bear out that the way a person feels, his attitude

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[6] *Simplifying Tomato Canning Factory Operations,* Purdue Univ., Exp. Sta. Bul. 528, 1948.

toward the job or his boss, and the working conditions affecting comfort, monotony, and fatigue, along with other personal and environmental factors, may be dominant in explaining individual differences in output.

Very little educational work by the Extension Service has been done in helping farmers better understand the basic principles of good worker relations. In this connection, as in instruction, there is probably no better set of suggestions than those contained in the training course used in industry on job relations (JRT).[7]

The foundations for good relations brought out in this course, are:

Let each worker know how he is getting along.
Give credit when due.
Tell a worker in advance about changes that will affect him.
Make best use of each worker's ability.

Illustrating the above principles by carefully selected cases from farmers' experiences, and by giving farmers or their foremen an opportunity to present labor problems for group discussion and analysis is an excellent form of training.

Examples of some state publications on farm labor relations are:

Labor Operator Relationships on Indiana Farms, Purdue University Station Bulletin 546.
Farm Labor Management, Michigan State College, FM 359.
The Farmer and His Help, Oregon State College, Extension Bulletin 683.
Are You A Good Boss? Cornell Extension Bulletin 646.

A Program In Labor Management

Worker training and labor relations constitute the major elements in a program of labor management. This is a field of educational work that can well be given greater emphasis and special identity in our extension programs. As in other lines of work, it should be based on helping farmers with their problems.

There are some four million seasonally hired workers used on farms in the United States. Many of them are new workers each year. In concluding, it might be helpful to outline some specific items that a farmer needs to consider in developing a good program in labor management for seasonal workers. Many of these items would apply to other workers. An extension program would need to consider the assistance needed by farmers and workers concerning these same items.

A. Organization of Work and Preparation for Workers.
   1. A plan for each day's work.
   2. Jobs to be done and workers needed.

[7] *Extension Farm Labor Circular* 27, U.S.D.A., May 1945.

3. Duties for each member of the crew.
4. Equipment in good working condition.
5. Safe working conditions on the farm.
6. Enough containers and other supplies.
7. Drinking water and toilets in the field.

B. Supervision and Training of Workers.
1. Leaders for contacts with workers.
2. Work leaders who understand their job.
3. Best use of each worker's ability.
4. Size and coordination of crews.
5. Instruction on the job in the best-known methods.
6. Training materials as aids for instruction.

C. Farmer-Worker Relations.
1. Clear understanding of job conditions.
2. Method of pay to fit conditions.
3. Work incentives.
4. Appreciation for work done.
5. Interest in the worker's welfare.

D. Living Conditions for Workers.
1. Clean, comfortable, and adequate housing.
2. Meals that fit the worker and the job.
3. Acceptance in community activities.
4. Schools, recreation, and shopping facilities.
5. Hospital and medical care.
6. Insurance protection.
7. Transportation to and from work.

DISCUSSION

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In reviewing the three papers which have been presented on the subject "Labour Efficiency," I would first like to commend the speakers on their excellent presentation of these papers. I would also like to congratulate those who organized the program and had the papers arranged in this order. In a first paper we heard the "what to do" phrase of improving labor efficiency. This was given a full and complete coverage and provided an excellent background for the papers that followed. These other papers dealt with the "how" part of the question and made a very fine sequel to the discussion. Thus, with the subject broken down into these two phases of "what to do" and "how to do it," I am sure all who listened to the speakers must have gained much helpful information.

In dealing with the first paper, "Improving Labour Efficiency Through Improved Farm Organization," we must remember that farm organization is an individual problem and it must be done on an individual basis. The proper organization of work not only applies to farming, but it also applies to university professors and civil servants. Many men in various fields work long and hard

and yet do not seem to accomplish very much. Some farmers also work very hard and very long, but I do not believe these are always the most efficient operators.

As specialists in farm management we should constantly keep this subject before us. It seems to me we are called upon to prescribe on two main types of information. These are: (a) recommendation for general farms practice, and (b) information of specific problems on individual farms. These, of course, vary according to geographical position and the type of farming with which one is dealing. For instance, in our own case, in recommending general farm practices we advocate the use of chemical weed killers, functional buildings, and grassland farming. The saving of labour in chemical weed killing is obvious. In functional buildings, animals go to the job instead of the farmer taking the job to the animals. In our grassland program we suggest changes in organization from a strict rotational type of farming to a complete grass cropping system. In this way fields are only ploughed when the sod becomes thin or weedy. Manure is used as a top dressing rather than worked into the land. Heavier applications of fertilizer and lime are used, as these are the least expensive of the cost items. All these practices tend to make for improved labour efficiency.

In dealing with specific problems on individual farms, we find these range all the way from recommending how a barn should be remodeled to laying out a complete cropping system. In doing this, it is necessary to obtain full support from all other Departments and particularly from our agricultural engineers, animal husbandmen and extension specialists. Wholesome cooperation between Departments tends to improve our organization; I believe that the better organization we have among ourselves, the better will be the organization on the farms on which we work.

In discussing the second paper, I would like to say that if our North American agriculture is going to have greater efficiency in its production, it seems that this might well be brought about as a result of a series of concentrated studies on individual farm enterprises.

It is all right to talk about the need for improved labour efficiency in the general farm picture, but if our farmers are going to compete with other industries for labour they must first be made to realize the need for increasing their efficiency. This can be done in a general way, and one should not dwell on it too long before actually showing them how their inefficiency can be improved. This must be done in a specific way on the basis of individual farm enterprises.

In this connection it seems that our work in research has gone far ahead of our extension program. I would like to see greater emphasis put on the extension phases of work simplification and the dissemination of information that has already been gathered among our farmers. A variety of excellent material has been written on the broad subject of labour efficiency. Many studies have been completed which show how labour efficiency might be improved on individual farm enterprises. Yet our farmers do not seem to be well enough acquainted with this information. Thus, a big job of education and extension is yet to be done in this field.

Also let us not forget the great many gadgets, innovations, and new ideas that the farmers think up for themselves. Some of the best labour-saving practices or devices that we use originated from some of our farmer friends. For that reason I always like to see farmers taking a little time off once in a while to visit other farmers in another part of the country and exchange ideas with them.

DISCUSSION

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This has been a very productive session. Rather than attempt a complete discussion of all three papers, I have narrowed my comments to items directly or indirectly related to the use of work simplification techniques.

With respect to Dr. Nesius' effective case for increased labor utilization research on farm enterprises, I have these general comments:

1. While action to improve labor's productivity is properly taken at the enterprise level, the enterprise alone may be too narrow a base on which to make major equipment and even work method decisions. This is especially true on diversified farms where many enterprises may share in the use of a capital item. This fact has caused us to shift part of our labor utilization research from an enterprise to a "functional" approach. For example, it may be necessary to study the total water needs—the watering function—for the farm business to arrive at the optimum system of providing water for the hog enterprise.

2. It seems to us that work simplification or motion and time study techniques are useful for at least two broad purposes. First, they provide (and aid in the further development of) principles of effective work. These principles help us systematically to develop easier, more effective and more economical work processes—often within the framework of existing capital equipment. Teaching and use of the principles of effective work may cause the individual to become a more effective job analyst in his own right. Second, motion and time study techniques of measurement provide the economist with a research tool for collection of data which previously appeared unavailable. As Dr. Nesius has pointed out, if exact labor and capital inputs can be measured for varying combinations of equipment and work processes, rates of capital-labor substitution can be computed. It should be pointed out, however, that this task appears much simpler on paper than it is in practice. To obtain reliable labor (time) standards for certain of these analyses, it may be necessary to set up and take measurements on controlled experiments.

Hence, work simplification provides us with (1) principles and guides, and (2) techniques of measurement which are essentially research tools.

3. It may be dangerous to classify mechanical innovations and work process changes together as was done in Dr. Nesius' second way of improving labor efficiency. Admittedly, they are closely related. Before analyzing the extent to which capital in the form of machinery and equipment will substitute for labor, the job analyst needs to measure the level of efficiency with which labor and capital are presently combined, using existing work methods. Further, opportunities for improvement within the framework of existing capital should be carefully examined before introducing additional capital inputs. Opportunities for improvement in labor utilization at this level are so great that they present to the farmer and job analyst a real challenge. Farmers may reject suggested improvements which require additional capital on the grounds of capital rationing. But if substantial economies are possible without further investment, a major objection to farmer acceptance is removed.

Actually, the rates of capital-labor substitution obtained will depend, in part, upon the effectiveness with which existing capital and labor are used. For example, the existing method of cleaning a dairy barn was recently studied. In the original method, two men loaded the manure onto a wheelbarrow, wheeled it to an outside pile, and later loaded it by hand onto a spreader. One

man was idle waiting on the second a substantial portion of the time. A gutter cleaner was suggested. And upon study, it appeared to be an economical investment. For every dollar annual use charge on the gutter cleaner, several hours of labor would be saved.

But other alternatives to the gutter cleaner were also available. With existing equipment the spreader could be pulled through the barn and the manure loaded directly instead of using the wheelbarrow and handling the material two or three times. Idle time was reduced also. Thus the drive-through method was a vast improvement over the wheelbarrow method. And when compared to the drive-through method, the gutter cleaner was no longer so desirable economically.

This discussion suggests: (a) do not discount the improvements potentially in work process analysis, (b) go as far in improving effectiveness and efficiency as is possible before introducing substantial additional capital inputs, and (c) use the improved work processes as a base for computing capital-labor substition ratios when testing the feasibility of additional capital inputs.

4. The importance of the first area of needed research outlined by Dr. Nesius should not be overlooked. Particularly do we need to know the marginal value productivities of certain operations performed on individual enterprises. Work simplification techniques provide us with one method of determining the economic contribution of certain farm practices.

Dr. Johnston frequently referred to "the ability of the farm operator to convert inputs into returns" and to the "level of management available." Presumably, management consists of making decisions, of doing or of not doing something. If so, action taken or not taken can be described. And the consequences of this action should be measurable. If they are measurable, we should be able to determine why some farmers "get 70 bushels of corn from the same agents of production which are used by others to produce 50 bushels." Some of the reasons for differences among individuals in their ability to convert inputs into returns lie in the area of farm practices.

Research in farm practices is difficult at best. Association and correlation analyses relating practices to earnings have been inconclusive. Research to date suggests that certain traditional practices are probably unnecessary. Certain practices ostensibly for sanitation or quality requirements in fluid milk are a case in point. We may have to set up some controlled experiments to get the answers, as is now being done in the St. Louis milkshed. Whatever it takes, we need to find out which among our farm practices result in little or no actual increase in quantity or quality of output.

In connection with both Dr. Nesius' and Mr. Vaughan's papers, one further factor influencing labor's productivity was conspicuous by its absence. I refer to the incentives offered the worker. The operator, whether he rents or owns his farm, presumably has the ultimate in incentive programs. His earnings, within limits, are what he makes them. How about the hired worker? What motivates him to accomplish something rather than just put in his time? I'm not suggesting a speed-up. But the relationship between productivity and earnings varies widely among individual farm workers. A relatively small proportion of our farm work is adaptable to piecework methods of payment. Bonuses and share-of-earning incentives have not worked too well in agriculture. Yet if a worker is economically rational, presumably there is some way to motivate him to greater accomplishment, to improve his will to work. Maybe he is not motivated primarily by economic incentives. Perhaps this is an area in which psychologists and economists can join forces in some future investigations.

FARM MANAGEMENT RESEARCH

Chairman: W. V. Longley, Department of Agriculture, Nova Scotia

EVALUATING THE EFFECT OF A CHANGE IN A FARM MANAGEMENT PRACTICE: MOW-CURING HAY*

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THE problems of estimating the economic importance of a change of policy, of a method of behavior, or of a new item of farm equipment are constantly plaguing the program administrator, the farm management specialist, and the farmer himself. The basis of many decisions is oftentimes the hearsay, beliefs, and conflicts which have arisen out of a few personal experiences of the individuals concerned. Such individuals would be more than human were they to exclude all personal interest or bias, or even to weigh impartially the various conflicting ends.

While the research worker is not without taint, he is probably in a better position to carry out the empirical research necessary for accumulation of evidence than are workers charged with the extension or utilization of his findings. It is up to him, in planning his research and carrying it forward to completion, to be sure that laws of scientific objectivity are followed.

A problem which confronts us in Vermont, and which has been drawn into this paper to illustrate the relationship of theoretical to applied economics, stems from a life situation. It seeks an answer to the question: What are the relative advantages of field-dried as compared with mow-cured hay? Public utility companies advocate mow-curing, since it promotes sales of equipment and consumption of electricity. Agricultural engineers have prepared plans for the construction of mow-curing systems, as well as brochures advocating their use. Agronomists are enthusiastic about mow-curing as a means of harvesting hay at the optimum time, with less danger of damage to the crop as a result of bad weather conditions. And the dairy production research worker has reported on the nutritive value of roughage handled in this manner. It is now the job of the agricultural economist to draw together theories and research findings and define the problem in terms of the uncertainty which exists in the minds of some individuals or groups concerning the economics of the practice. In other words, he should be able to make some statement

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about the effect of feeding mow-cured hay upon the cost of producing milk.

Any other problem of a similar type might be substituted in the place of the mow-curing example. Rates of fertilizer application for specific soils and crops, use of milk tank-pickup trucks at the farm, woodlot management, and barn renovation are but a few of the many areas in which we lack knowledge of the economic effect of change. The mere fact that a new practice has a novelty which seems progressive does not necessarily mean that it is any closer to an ideal than are established procedures which may now be regarded as old-fashioned.

The economics of the firm sets up the production and profit models which guide our acceptance or rejection of the original hypothesis. The results attained by farmers who make changes in their farm management pattern should be presented, along with the comparable results attained by the farmers who continue in their customary pattern. In this way farmers contemplating a change may appraise, in advance, the probability of more closely approaching their goal, whether it be in terms of greater total production, lower unit costs, or increased profits.

In order to make such appraisals, information is needed about physical input-output relationships and costs, for at least two alternative situations. One group, which might be thought of as a "control" group, would continue their current practices; while the other group, which might be thought of as "experimental," would institute new methods. In our example the control group was made up of farmers who had fed field-dried hay to the cows in the past, and who continued to do so during the two years of the study; the experimental group was made up of farmers who changed over to the feeding of mow-cured hay in the second year. All farmers under study were members of Dairy Herd Improvement Associations, with the consequent advantage of relatively accurate input-output records. The sample group was restricted in size because of the small number of farmers in the state who were contemplating installing this type of equipment in 1949. Only 33 farmers could be located who not only had this intention, but who were also members of Dairy Herd Improvement Association groups. The efficiency of this small sample was improved by pairing each experimental farm with a control farm on the basis of two measurable variables, production per cow and cows per farm.

The pairing process removes much of the variability characteristic of farm management data, and makes it possible to obtain more definite information. Differences which might not appear significant for unpaired data prove of importance when variation within treatments is reduced. While the sample was relatively small, it was well adapted to the statistical treatments planned, which included use of tests of significance and analysis of variance whenever such procedures seemed justified.

On the basis of attributes, all 66 records came from Vermont dairy farmers processing wholesale milk which met standards set up for the Boston market. All fed varying quantities of hay, grain, and silage. All prices were paid or received within one marketing area in the same year. Tests were run to search out lack of homogeneity among operators in terms of length of farming in the area and of distribution of purebred as compared to grade herds (Table I).

TABLE I. RELATIONSHIP OF OWNERSHIP OF PURE BRED HERDS AND LENGTH OF STAY IN AREA TO USE OF MOW-CURING EQUIPMENT

Comparison	Hay Treatment		
	Control	Experimental	Conclusion (X^2)
	Number of farmers		
Newcomers	22	11	Not significant
Old timers	11	22	Not significant
Purebred herds	12	21	Not significant
Grade herds	15	18	Not significant

Not only were these differences found insignificant, but there appeared to be no tendency for men installing mow-curing systems to have purebred herds, or to be newcomers to the area. The farms included in this study were well above the average for the state in milk production, with an average of 7,850 pounds of four percent milk per cow. The state average was about 5,600 pounds, and the Dairy Herd Improvement Association average in 1948 was 7,642 pounds. In short, conditions for the control and the experimental groups were well above the average for Vermont farms, but among themselves they were fairly homogeneous.

The accumulation of data followed the usual routine. Each farm was visited at 12-month intervals; and records of milk output, feed inputs, and costs were secured. Barns were examined, and in the case of the experimental group the physical construction of the mow-curing equipment was measured and costs obtained. In the second year of the study, meters were installed on mow-curer motors to learn electrical energy consumption as well as actual operation costs.

The data secured were processed in the Station's office in much the same manner as are any other cost-of-production records. Each farm was considered an independent sample and used as a unit. From the data collected, information about construction and operating costs of the mow-curing equipment units was extracted and was published as a Station pamphlet (Vermont Pamphlet No. 20).

The main factors used in this analysis of the economic effect of mow-curing hay include the following: production of four percent milk per

cow[1]; pounds of barn fed hay, grain, and silage per cow and per hundredweight of milk produced; total net cost per hundredweight to produce milk; costs of barn feed units per hundredweight; and the margin of sales over production costs on a per cow basis.

A description of the treatment of the data discussed above and the interpretation given the findings are summarized in the tables which follow. Scrutiny of the publications of other research workers concerned with the same problem, as well as of the techniques used in similar studies, necessarily took place. None of the reports found of mow-curing investigations took into account the cost-of-milk production factor. Study of allied materials on the behavior of dairy cows in response to varying quantities of feed inputs helped greatly in interpreting results, as well as in the formulation of statistical trials and procedures. For example, in United States Department of Agriculture Technical Bulletin 815, *Input-Output Relationships in Milk Production,* the response of milk production to increased feeding was so described that the existence of a joint relationship between various feed inputs seems certain. If the problem had warranted the effort, the index of joint correlation would probably have been higher than was the multiple correlation coefficient. Likewise, the interserial relationship of these same feed input variables was pointed out by the statement (well-known to every farmer) that when a cow is fed more of one type of feed she will consume less of another. If our problem had been that of prediction of production response to feed, and if control groups had not been available, these two conclusions might have made our study appear hopeless.

It was assumed in this experiment that the two groups would be affected alike by the same limitations; therefore, our concern was reduced to estimation of significance of differences and of extent of change. An understatement of the extent of the relationship between the factor under study and the dependent variables affected by it probably holds for both control and experimental groups.

Before attempting a careful analysis of the data, two tables were prepared. The first showed that the average change in milk production which came about on farms where mow-curing equipment had been installed was 425 pounds of milk per cow (Table II). The second compared the grain, hay, and silage inputs of the two groups. Slightly less grain was being fed the experimental group, but hay and silage feeding rates were higher. Only the difference in silage feeding rates approached a significant level (Table III).

Five steps were taken in this attempt to evaluate the effect of a change in one factor (treatment given hay) upon other factors looked upon as

[1] Milk standardized by use of the Gaine's Formula.

more or less dependent (milk production per cow, production costs per hundredweight of milk, and net income per cow). While many other types of analysis might have been used, these five involved a great deal of work, and the results corroborated one another sufficiently so that the other types of investigation which had been visualized were not used.

TABLE II. THE EFFECT OF FEEDING MOW-CURED HAY ON PRODUCTION PER COW

Condition	Control	Experimental
	Pounds of 4 % milk per cow	
Before introducing mow-curing equipment	7,834	7,871
After introducing mow-curing among the experimental group	8,338	8,763

TABLE III. COMPARISON BETWEEN USE OF MOW-CURED AND FIELD-DRIED HAY AS SHOWN BY AVERAGE INPUTS OF GRAIN, HAY, AND SILAGE PER HUNDREDWEIGHT OF FOUR PERCENT MILK

Inputs	Pounds of inputs per hundredweight of 4 % milk produced	
	Control	Experimental
Grain	31.4	30.4
Hay	44.8	48.3
Silage	42.6	50.3

The respective stages in this study were:

1. Independent scrutiny of all averages and associated statistics which might be used in this study or contribute toward an understanding of the problem.
2. Comparison of differences between control and experimental groups:
   a. In year before experiment was conducted to learn degree of homogeneity existing between groups.
   b. In year of experiment to learn extent and significance of any change.
3. Analysis of variance to learn proportion of variability due to difference in treatment of factor under study.
4. Scrutiny of the advantage gained in prediction by including (as compared with omitting) the factor under study in a rationally conceived multiple correlation.
5. Computation of appropriate multiple regression equations, and use of them to learn effect of change in variable under study with changes in other variables looked upon as dependent.

Some of the more important of the statistics studied in the first step are reproduced in Table IV. The stability of one of the factors used in the pairing process, cows per farm, established the homogeneity of the sample, between groups and for both years under study. Another of the

TABLE IV. COMPARISON OF RELIABILITY OF SELECTED AVERAGES FOR CONTROL AND EXPERIMENTAL GROUPS FOR YEAR PRIOR TO AND YEAR OF EXPERIMENT

Factor	Year prior to experiment Group		Year of experiment Group	
	Control	Experimental	Control	Experimental
Cows per farm				
Average cows	29.3	30.1	30.2	30.1
Confidence limits	25.0–33.6	25.6–34.6	25.5–34.9	25.5–34.7
Standard deviation	12.1	12.4	13.0	12.8
Coefficient of variability	0.41	0.41	0.43	0.42
Milk production per cow				
Average pounds	7,834	7,871	8,338	8,763
Confidence limits	7,319–8,349	7,304–8,438	7,719–8,957	8,117–9,409
Standard deviation	1,480	1,573	1,717	1,793
Coefficient of variability	0.18	0.20	0.21	0.20
Net cost to produce per cwt.				
Average dollars	4.02	4.38	3.79	4.22
Confidence limits	3.78–4.26	4.07–4.69	3.50–4.08	3.93–4.51
Standard deviation	0.69	0.84	0.81	0.77
Coefficient of variability	0.17	0.19	0.21	0.18
Price received per cwt.				
Average dollars	5.90	6.00	5.51	5.61
Confidence limits	5.82–5.98	5.90–6.10	5.43–5.59	5.51–5.71
Standard deviation	0.24	0.26	0.24	0.26
Coefficient of variability	0.04	0.04	0.04	0.05
Net income per cow				
Average dollars	148.	131.	147.	124.
Confidence limits	128–168	103–159	119–161	98–150
Standard deviation	57.	77.	80.	73.
Coefficient of variability	0.38	0.59	0.54	0.59
Grain fed per cow				
Average hundredweight	24.8	24.7	25.6	27.0
Confidence limits	22.2–27.4	21.9–38.6	23.4–27.8	24.0–30.0
Standard deviation	7.1	7.9	6.0	8.4
Coefficient of variability	0.29	0.32	0.23	0.31
Hay fed per cow				
Average hundredweight	39.4	43.1	37.3	42.4
Confidence limits	35.4–43.4	38.7–47.5	31.7–42.9	37.6–47.2
Standard deviation	11.2	12.1	15.7	13.2
Coefficient of variability	0.28	0.28	0.42	0.31
Silage fed per cow				
Average hundredweight	26.9	37.7	33.5	43.4
Confidence limits	19.1–34.7	29.3–46.1	26.1–40.9	32.8–54.0
Standard deviation	21.7	23.4	20.6	29.4
Coefficient of variability	0.81	0.62	0.61	0.68

sorting factors, milk production per cow, is shown with comparable statistics for the year prior to a change in practice by the experimental group, but with an increase in production by both groups the following year and a much greater increase in milk production among the herds which were subject to the experiment.

Comparison of other factors in the same manner served as preparation for further study and gave advance indication of changes which might later be shown as significant. Some factors, of course, were immediately eliminated in Step 1, as undeserving of further attention. The difference in the price received per hundredweight of milk, for example, due to zone differentials, was neglected beyond this point.

The second step of the analysis was broken down into two parts. In the first part, the differences between paired observations for the control and experimental groups were tested for significance in the year prior to the experiment. As might be expected in samples matched for uniformity, there was evidence of homogeneity among nearly all factors (Table V). The main exceptions, a notable difference in net cost of producing milk,

TABLE V. COMPARISON OF SIGNIFICANCE OF PAIRED DIFFERENCES BETWEEN AVERAGES OF CONTROL AND EXPERIMENTAL FARMS FOR SELECTED FACTORS FOR YEAR PRIOR TO AND YEAR OF EXPERIMENT

Factor	Year prior to the experiment		Year of the experiment	
	Difference	Calculated value of "t"	Difference	Calculated value of "t"
Cows per farm	0.8	0.96	0.1	0.06
Production per cow	36	0.22	425	1.64[c]
Net cost to produce	0.4	2.02[a]	0.4	2.68[d]
Price received per cwt.	0.1	1.85[b]	0.1	1.85[b]
Net income per cow	17.	1.30	23.	1.44
Grain fed per cow	0.1	0.03	2.0	0.85
Hay fed per cow	3.7	1.21	5.1	1.99[a]
Silage per cow	10.8	2.03[a]	0.9	1.40

[a] .05% level. [b] .07% level. [c] .10% level. [d] .01% level.

in price received, and in silage fed per cow, helped explain otherwise confusing results discovered further along in the analysis.

It was expected that differences would be greater in the year when the factor under study was treated by the experimental group in a way different from that used by the control group. One dependent and one independent factor stood out as decidedly different in the year of the experiment: production per cow and quantity of hay fed per cow. The other important input factors, silage and grain feeding per cow, were not pointed up as noticeably different.

From the study of differences, the 425 pounds per cow difference in milk production among cows fed mow-cured hay, as compared with those receiving field-dried hay, suggested an advantage for that type of treatment. On the other hand, these same herds were fed 515 pounds more hay per cow; therefore, the question was further confused by a change in the size of this input.

This led to the third stage of the study—the analysis of variance method of separating the variability which occurred among the matched pairs of herds from that which was attributable to treatment (Table VI). Apparently production per cow was significantly greater among herds which were fed more mow-cured hay. This was also true of barn feed costs, which increased materially with the introduction of mow-cured hay, since it required extra handling and expensive treatment.

TABLE VI. ANALYSIS OF VARIANCE TO LEARN PROPORTION OF DIFFERENCE BETWEEN AVERAGES FOR SELECTED FACTORS DUE TO DIFFERENCE IN TREATMENT GIVEN HAY

Factor	Variance ratio (calculated value of F)	
	Among pairs	Between treatments
Production per cow	1.24	3.24[b]
Net cost to produce	1.00	0.25
Barn feed cost	1.41	7.67[a]
Grain fed per cow	1.53	1.33
Hay fed per cow	1.02	0.11
Silage fed per cow	0.74	0.12

[a] Significant at about 1% level.
[b] Significant at about 8% level.

It might be worth-while at this point to emphasize once again the importance of paired technique. The pairing process, applied to farm management data, ordinarily does not remove as much as one half the variation within treatments. In Table VII, it will be seen that over one half the variability was removed when the effect of mow-curing was related to milk production. This, in itself, is a good criterion of how good a pairing job was done.

TABLE VII. SUMMARY OF COMPUTATION DEVELOPED IN STUDY OF PROPORTION OF VARIABILITY IN PRODUCTION DUE TO DIFFERENCES IN TREATMENT GIVEN HAY
[For control group (production in prior year)—(production in year of experiment)—(For experimental group (production in prior year)—(production in year of experiment)]

Source of variation	Sum of squared deviations	Degrees of freedom	Mean square	F
Among 33 pairs	30,303,358	32	946,980	1.24
Between 2 treatments	2,479,710	1	2,479,710	3.24[a]
Discrepance	24,515,320	32	766,103	Basis of comparison
Total	57,298,391	65		

[a] Significant at the 7% level.

As we are concerned with our ability to predict the influence of a change in a practice on physical output, and from there, through sales, along to the economic returns to the farmer, it seemed well to set up a test by means of multiple regression techniques. A reasonable formula, in this case, and one generally accepted, is that milk production is at least partially dependent upon the amounts of hay, grain, and silage fed a cow. This might be expressed as $E = a + B_{y1.23}X_1 + B_{y2.13}X_2 + B_{y3.12}X_3$. In the process of solving the regressions coefficients, the gross correlations of milk production with amounts of grain, hay, and silage were found (Table VIII). From these, the multiple correlations of milk production with grain, hay, and silage fed were developed. It may be seen that while the pooled correlation coefficients are significant, this is only true of the

gross correlations and standard regressions of milk production on grain. Since the value $R_{y.123}$ is but a little higher than r_{y1}, for both control and experimental groups, we have little statistical evidence that the prediction of milk production from grain feeding is improved through the addition of other variables, such as quantities of hay or silage fed.

TABLE VIII. COMPARISON OF CORRELATION AND STANDARD REGRESSION COEFFICIENTS OF MILK PRODUCTION ON SELECTED INPUT FACTORS FOR CONTROL AND EXPERIMENTAL GROUPS IN YEAR OF EXPERIMENT

Milk production Y	Correlation of Y on X's		Standard regressions of Y on X's	
	Control	Experimental	Control	Experimental
Grain (X_1)	0.5747*	0.7679*	0.5354*	0.7410*
Hay (X_2)	0.1908	0.2664	0.1745	0.0457
Silage (X_3)	0.2351	0.1957	0.3040	0.0648
Multiple correlation $R_{y.123}$	0.6423*	0.7706*		

* Significant at the 1% level.

This evidence of the relatively small effect of hay feeding on milk production is further substantiated by presenting the relationship of hay fed per cow to production in tabular form (Table IX). While subgrouping of factors by the tabular method, especially with a small sample, fails to hold constant the effects of independent variables, correlation analysis indicates the net effect equally well, whether or not interserial relationships are present. As increased amounts of hay are fed per cow, with grain and silage held constant, production is increased very slightly. When grain is reduced somewhat, production is curtailed, and very little of the loss is regained by increased feeding of hay. There is no indication of any added value in mow-cured as compared with field-dried hay in this final check.

TABLE IX. THE RELATIONSHIP OF HAY TREATMENT TO MILK PRODUCTION PER COW WITH QUANTITIES OF SILAGE HELD CONSTANT AND GRAIN FED AT TWO LEVELS. (Based on regression equation $E=a+B_{y1.23}X_1+B_{y2.13}X_2+B_{y3.12}X_3$)

Pounds of hay fed per cow	Production per cow			
	All cows fed 2610 pounds grain—3900 pounds of silage		All cows fed 2000 pounds grain—3900 pounds of silage	
	Control (Field-dried)	Experimental (Mow-cured)	Control (Field-dried)	Experimental (Mow-cured)
3,000	8,289	8,569	7,351	7,644
3,500	8,449	8,603	7,552	7,678
3,990*	8,606	8,637	7,669	7,712
4,500	8,770	8,672	7,833	7,746

* Average relationships.

Conclusions in regard to the effect of changing the method of treating hay, among farmer members of Dairy Herd Improvement Associations (with weather conditions which existed in Vermont in the summer of 1949), are summarized in the last sentences of the preceding paragraph. With no appreciable difference in the price received per hundredweight of milk sold, and with roughage costs for mow-cured hay substantially above those for field-dried hay, the dairy farmers who install the newer curing systems are at a disadvantage. The advantage of a greater production per cow, which apparently is not attributable to hay treatment, is considerably less than the disadvantage of additional costs; since not only are unit costs higher but net return per cow milked is less.

This analysis does not tell of the value of a mow-curer in years of adverse weather conditions. The hay dried in the field in the year of the experiment must have been superior to that of a prior year; since with fewer inputs, production on the control farms was increased. The problem deserves further study over several years, but with duplication of the techniques employed.

GETTING RESEARCH DATA BY GROUP CONFERENCE

S. A. Engene
University of Minnesota

ONE serious problem in research is to obtain useful, reliable ideas and data at a reasonable cost. In farm management research, we have used several methods. The most common have been the survey or personal interview, records kept by farmers, and secondary data such as the census and experimental work done by workers in other fields. We must add to this the direct observations and experiences of the research workers. We might profitably make use of group interviews or conferences as an additional method. I would like to evaluate this method on the basis of our experience during the last two years.

We used this method in a study of farm readjustments in the Red River Valley of Minnesota. This is predominantly a cash grain area. Many people in the area ask, "Should the farmers continue with cash grains, or should they increase livestock production?" "What is the most profitable crop and livestock pattern?" These questions set one of the important objectives of our research.

We had done little farm management research in this area during the past 20 years. It is in a far corner of the state, so we do not visit it very often. Farming techniques in the area have been changing rapidly. A second objective of our research, therefore, was to improve our knowledge of the practices and problems of the area. This would improve our teaching and help to guide later research.

In attacking the first objective—finding profitable crop and livestock organizations—one possible approach was to evaluate a series of organizations by budgeting. This would provide a framework of general conclusions to serve as a guide for more detailed research. However, we lacked many of the facts needed for construction of the budgets. In our planning, we considered a field survey to obtain this information. An alternative suggestion was to bring together groups of farmers, letting them suggest alternative organizations and provide the necessary estimates for the budgets. Since this procedure looked promising, it was adopted.

Description of Procedure

The first step was to call a meeting of farmers in each of the six counties involved. The county extension agent invited from 15 to 20 farmers, scattered over the county. We drew the group into a discussion of trends and problems in the area. No fixed pattern of discussion was used; rather, we followed any leads that seemed profitable. Our primary

objective was to become familiar with the area, to get our feet on the ground. These meetings also helped to break the ground for the following meetings.

The second step was to hold meetings for preparation of the budgets. Each county was divided into two areas—the heavy, clay soils and the light, sandy soils. For each area the county agent invited a group of farmers, aiming to get from five to 10 in attendance. We asked him to get farmers who were (1) experienced, (2) shrewdly observant and analytical, and (3) able and willing to express themselves in a group. In so far as possible, all farmers in a given group represented the same size of farm. Meetings were held with 11 different groups. About 125 different individuals participated.

The organization of the discussion at these meetings as we developed it through experience was as follows: A few minutes were spent in explaining the purpose of our research and of the meeting, and in selling them on the value of participation. We then asked them to develop the answers to these questions: (1) If you are interested in maintaining or improving the productivity of your soils, what rotations would you suggest? For the time being, ignore the profitability of these rotations. (2) On the basis of the average yields of crops in this county for the past 10 years, what yields would you expect for each of the crops in each of the various positions in the rotation? (3) If you followed each of these rotations for 20 years, what would happen to yields? This discussion took about two hours, which was enough for one day. They were then invited to a second meeting.

After the first meeting, we summarized our notes. Our outline at the second meeting was generally this: (1) We presented the summary of the first discussion and asked them to make any corrections they considered desirable. (2) We reviewed the total production of the different rotations, in physical and in financial terms. (3) The group discussed the possibilities for adding livestock with those rotations which included hay or pasture crops. These discussions were not entirely satisfactory because the farmers were unable to give reliable estimates of livestock production and feed consumption. We had to use data adopted from studies in other parts of the state. (4) The farmers named the kinds, sizes, probable cost, and probable life of the machines needed for a farm of some specified size. (5) They listed the typical operations, time required for each operation, and cash outlays for each crop.

We did not complete the budgets at the meetings. We found that the other information gained from the group discussion was more valuable than the details of completion of the budgets.

At no meeting did we give any results obtained at other meetings. Each group reached its decisions independently. After completion of

these meetings, we summarized all of the results, showing how each group compared or contrasted with the others. Copies of these summaries were sent to all participants; then they were again called together to review their previous suggestions. Some changes were made, but this series of meetings contributed little to our information.

Summary of Results

Now, what results did we get? (1) We collected suggestions as to rotations. Most of these could have been developed without the meetings. The discussions, however, brought out a large number of ideas as to practices or difficulties connected with the rotations.

(2) The farmers gave estimates of yields for the different positions in the rotation. They gave estimates of differences between rotations, and of trends over time with each of the more important rotations. We obtained more detail on yields than I have seen in any other place. As an example, the two most common rotations, with estimated yields for the first cycle, were:

	Rotation I		Rotation II	
First year	Wheat	23 bu.	Wheat	26 bu.
Second year	Barley	28 bu.	Barley	33 bu.
Third year	Wheat	15 bu.	Wheat	18 bu.
Fourth year	Summer fallow		Alfalfa	1.7 tons
Fifth year	None		Summer fallow	

The manner in which the farmers developed these estimates gave considerable confidence in their reliability. The estimates of the different groups were remarkably uniform. We also discussed these estimates with the soils men and agronomists of the experiment stations of Minnesota and North Dakota. Although individuals disagreed, the consensus of opinion supported the farmers' estimates.

From these estimates we have been able to construct production curves for a given area of land, using varying proportions of grains and forages. This has provided empirical data for the curves presented by Heady in the November 1948 issue of *this Journal.*

(3) The farmers gave estimates of input and output data for crops. These were adjusted to estimates of needs for the future. The farmers were unable to give satisfactory data for livestock; they do not have figures of that type readily available.

We have had an opportunity to check these data in another way. Last fall, a year after the other work was done, we made a survey in the same area, visiting a random sample of farmers. We included questions covering many of the same items obtained in the group conferences, such as yields at various positions in a rotation, operations performed on crops, and performance rates for different field operations.

For wheat following summer fallow, the groups estimated a yield of 23 bushels per acre, the farmers in the survey said 23.5 bushels. For barley the following year the group said 28 bushels, the farmers surveyed said 30.4 bushels. The groups said wheat yields would drop eight bushels from the first year after summer fallow to the third year; the average for the few farmers in the survey who gave this information was 7.2 bushels. The other information checked about equally as well. The group meetings, however, provided data for a much wider range of conditions than did the surveys.

Evaluation of the Procedure

This gives a brief outline of the methods used. An evaluation may be helpful to anyone considering the use of this method. This evaluation is based upon one project, with a few other limited experiences at earlier dates. It must, therefore, be considered as suggestive rather than conclusive. Here are some of our conclusions:

(1) The Group Conference Method is a stimulus to thinking and to developing new ideas. These farmers tried to develop a balanced judgment of the problem and to expand upon new ideas much more aggressively than in an individual interview. I believe we developed our own thinking more effectively than we could have done by use of our other customary research techniques. This stimulus to thinking is especially important in the early stages of a research project, when the expansion of new ideas is more important than exact measurement.

(2) This method can be useful for problems for which any one farmer's observations are incomplete. For example, these farmers had had only limited experience with alfalfa. Most of them were not willing to formulate judgments on the basis of their own experience alone. By describing their own observations and weighing them against those of the other men present, they were able and willing to form judgments.

(3) This procedure can be valuable for problems which involve formulation of judgments concerning complex issues. In this case, we may be interested in getting the judgments of shrewd, but not necessarily typical or average, men.

(4) The group conference is not effective for obtaining detailed information. It might be possible to obtain a limited amount of such information by asking each participant to fill in a questionnaire. It would not be suitable if an accurate estimate of some characteristic of an area were wanted. For example, the judgments of the groups as to trends in acreages of crops or numbers of livestock did not check with statistical data available.

(5) This method is probably usable principally for problems in which the farmers are interested and for which they can see some use. Some

exceptional leaders, however, may be able to stimulate interest in some abstract situations, and may be able to draw forth the necessary concentration.

(6) It is unlikely that this procedure can be used to obtain information of a personal nature.

(7) Biases may occur unless the method is used with care. Results can be obtained only if the participants will express themselves, and a farmer who will express his ideas in a group is not a typical farmer in all respects. Occasionally one individual will dominate the group. The group may also merely repeat ideas they have received from another source. For example, if a county agent calls the meeting, the group will be hesitant to express an opinion contrary to that which may have been expressed by the agent on other occasions.

(8) These meetings give the farmers a feeling of accomplishment. They feel that they have made a contribution to the research work. They also feel that they gained some valuable ideas by discussions with their neighbors.

(9) The meetings combine effective extension work with research. The county agents generally were satisfied that their time was well spent. The participating farmers gained directly. They now constitute an informed, sympathetic nucleus around which to organize extension work for the dissemination of the results of the research project.

(10) The costs may be less with this method than with alternative procedures, although our experiences do not give an adequate basis for judgment. It would be possible to hold two two-hour sessions a day, with five to 10 people at each, or a total of 12 to 15 people a day. Two research workers usually would be needed for these meetings. In a project involving farm visits, they could visit from six to 12 people in a day, depending upon the type of schedule used. The total amount of information gathered might be greater than in the meetings, although the value of that information may be less. Travel costs would be higher for the farm visits.

Suggestions as to Techniques

As a final step in reporting on this procedure, some suggestions as to techniques may be valuable.

(1) The participants probably should be selected and invited by a person who knows them well, and who has won their confidence.

(2) They must be selected carefully. Our experience shows that the following characteristics are important: (a) They must have had experience with the problem being considered. This stipulation, however, may tend to involve a disproportionately large number of older people, with the final conclusions reflecting their attitudes. It may also reflect the

biases of the person making the selection. (b) They must be keen observers and good analysts. (c) They must be willing and able to express themselves in a group, and yet not be unduly swayed by the opinions of others.

(3) From five to 10 participants are desirable. If the group is small, the judgments are likely to be made by one person. With more than 10 persons, it is impossible to give each one an opportunity to express himself fully and it is hard to keep the discussion on the beam.

(4) Two workers make a good team. One will lead the discussion; the other will serve as secretary. In order to get results, the leader must be skillful in leading group discussion. He must be able to define clearly the problem to be discussed. He must be able to stimulate the participants to do most of the talking, and yet be able to hold them to the subject.

(5) From 90 minutes to two hours is probably the most effective length of these meetings. The group is likely to be tired at the end of that time, unless the leader adopts that delightful Scandinavian custom of serving a cup of coffee during the session. Two groups can be handled in a day, or one group can meet for two separate sessions. In some cases, it may be desirable to meet with only one group a day, and make some farm visits during the rest of the time.

We have been very well satisfied with our results. We expect to use this procedure again whenever it is suitable. If others who have used or will use it will report their experiences, further improvements can be made.

DISCUSSION

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Mr. Carter's approach to the evaluation of a change in farm management practice, using mow-curing hay for purposes of illustration, is of particular interest to me, since I have just been concerned with plans for a study of the economics of the production of alternative feed crops in Quebec, with particular reference to grass and forage crops. Mr. Carter recognizes the problem of joint relationships in farm management data in his application of statistical analysis. While he has dealt with some factors in detail, there are a number of others which might have some significant effect on the relative feeding value of hay cured under these two methods. These include the type of hay mixture, stage of maturity at harvesting, and the weather conditions. Since the results cover only one year's study, it would seem that weather conditions would be a very significant factor.

While I feel that this type of statistical analysis has some very definite limitations in connection with farm management studies, my main criticism of Mr. Carter's paper would be levelled at the choice of problem which he is attempting to study on the basis of farm records. His problem is essentially that of determining the relative feeding value of mow-cured vs. field-cured hay. I believe

that this problem cannot be studied adequately by the agricultural economist alone. It requires controlled laboratory experiments, including chemical analyses and feeding tests, and should be carried out with the cooperative efforts of the field husbandman, the animal nutritionist, the agricultural engineer, and the agricultural economist. This is only one of many projects in which I would plead for the research team approach.

Dr. McFarlane has described the method which he has used in his study of dairy farms in the Montreal milkshed.[1] This project, as Dr. McFarlane has said, is based on the application of Dr. Wheeler's budgetary analysis technique as used in the New England Dairy Study to an adjacent area in the Province of Quebec. We in Canada shall be very much interested in seeing the published results of Dr. McFarlane's study, which is the first use of this approach in farm management research in eastern Canada. I feel that the approach is one which we can use to very great advantage in connection with some of our farm management work. My main comment with respect to the technique employed would be concerning the desirability of having more complete information on the universe in which the study is made. The survey approach might be used to advantage in a new area in order to obtain more complete background data on farm organization.

I agree with Dr. McFarlane regarding the possibility of using farm management studies, and this approach in particular, in the solution of some of the broader economic problems in agriculture, especially resource allocation. We have found the technique very useful in an examination of a proposed irrigation project on the South Saskatchewan River in central Saskatchewan, and plan to apply it in connection with the establishment of a land-use program for the rehabilitated marshlands in Nova Scotia and New Brunswick.

Dr. Engene has outlined an interesting approach to the collection of research data by the use of group conferences. In his appraisal of the method he has mentioned its weaknesses as well as its advantages. It would seem that the biases which may result from the use of a small hand-selected group of this kind and from the influence of some of the stronger personalities present may be rather important. I believe that Dr. Engene would agree that this method may be most useful in connection with extension work, since direct participation would ensure a greater interest in the program. The technique would seem to warrant further use in farm management work.

DISCUSSION

H. B. JAMES
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I. *Evaluating Effect of Change in Farm Management Practice*

It appears that the problem of evaluating the effects of mow-curing hay has been made more complex than necessary by the incorporation of irrelevant variables into the analysis. As outlined on page 839, "The main factors in this analysis of the economic effect of mow-curing hay include the following: production of four percent milk per cow; pounds of barn fed hay, grain, and silage per cow and per hundredweight of milk produced; total net cost per hundred-

[1] Paper withdrawn by author.

weight to produce milk; costs of barn feed units per hundredweight; and the margin of sales over production costs on a per cow basis."

Is there any reason to expect the mow-curing of hay compared with field-drying to affect the production of milk per cow? If so, it must be a result of the differences in product or quality of hay. For an analysis of this phase of the problem, one probably would gain by working with the chemists and nutritionists and by using controlled chemical analyses and feeding experiments. The chemical analyses and feeding experiments would be more effective than the direct comparisons of herds because of the more rigorous control over variables.

It appears that the second factor, "pounds of barn fed hay, grain, and silage per cow and per hundredweight of milk produced," is independent, in this problem, of the hay curing process. If the question is the choice of the most economical process of curing hay, the above factors are irrelevant and merely complicate the problem.

Why include items of cost other than those which differ between the two hay curing processes, such as the third and fourth factors, "total net cost per hundredweight to produce milk; and costs of barn feed units per hundredweight"? The same question may be raised with respect to the fifth factor, "the margin of sales over production costs on a per cow basis." Also, there seems to be no logical reason for including the price of milk as a variable.

Before alternative procedures are suggested, several other questions might be asked and certain observations might be made.

(1) Would one expect a difference between curing processes in the quantity or quality of output (hay) as a result of weather conditions? If so, are weather records available which might be analyzed in order for one to gain insights into the probabilities of the occurrence of various weather conditions?

(2) Are the necessary conditions met in Table IV for the use of the statistical computations which are shown? In how many samples would one expect the mean of the size of herd to fall between 25.6 and 34.6 cows when samples are drawn in the manner described? Were the 33 herds in the experimental group a total population? What is the meaning of confidence limits for a total population?

(3) In Table IX, were the different classes of farms homogeneous with respect to pasture and stage in lactation, which are important variables? In this type of analysis, the effects of differences in pasture conditions and stage of lactation, if such differences exist, may be attributed to differences in the methods of curing hay.

(4) Where differences in the quantity of funds invested occur between two different processes, the costs in relation to output are very important. How were costs related to scale for the hay curing process?

(5) It is highly desirable that information be made available before large numbers of farmers have changed a practice. Are there means of accelerating research that would answer the economic questions with respect to a farm management practice rather than await "further study over several years, but with duplication of the techniques employed"?[1]

The following procedure is suggested as an alternative to that used by Mr. Carter:

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[1] Last paragraph, this study.

On farms in a particular area, would it be economical for one to substitute the mow-cured process for the field-dried process in the production of hay? To answer this question, it appears desirable to establish the beginning and the end of the process of production in which the inputs would differ between the two processes. Once the physical functions between inputs and outputs are established for the relevant ranges in output and the relevant ranges in physical resources, including weather for each of the two processes, the economics of the processes can then be tested for existing and potential price relationships and for different farming systems.

To establish the limits within the total process of hay production where the physical inputs and outputs would differ between treatments, one should consult the engineer, the agronomist, and the farmers who have adopted the new process, if any farmers have already made the change. For purposes of illustration, it can be said that the process of production in each case is identical up to and including mowing. Therefore, all inputs preceding this operation could be omitted in the analysis. In order to establish the second point, one must consider whether or not there are differences in quantity and quality of hay due to the treatments used. It is here that the economist must seek the aid of his fellow workers in chemistry, nutrition, and animal industry. It seems that the chemical analyses and controlled feeding tests would yield the necessary information with respect to quality of hay more accurately and more quickly than would direct comparison between farms where numerous relevant variables are not controlled. If there is no evidence of differences in quality and quantity of hay, the relevant process in our problem would end with the hay in storage, where it is ready to be fed, and output would be measured in terms of the physical quantity of hay. If there were sufficient evidence of variance between treatments in quality of hay, then one could take this into account either by measuring the differences in the value of the hay or by measuring those in the quantity of animal product that would be produced from a given quantity of hay from each of the two treatments.

After establishing the limits within which the relevant comparisons are to be made, one is ready to determine the physical inputs by seasons for this portion of the production process. If no farmers have adopted the new practice, the economist may have to depend largely upon the knowledge he is able to gain from his co-workers in engineering and in agronomy. If a few farmers have adopted the practice, it would be well to obtain relevant input data from them also. If the quality of hay were found to be different between processes because of differences in weather damage, this reduction in product may be computed from probabilities of loss based on long-run weather data and added to the cost of the appropriate process, or it may be considered as a lower output from a given quantity of inputs.

The appropriate factors may be measured mathematically if the number of observations is sufficiently large and the population sufficiently homogeneous. However, if the observations are few and homogeneity is questionable, the simple arithmetic of the budget appears to be more appropriate, especially if a large number of items are to be included.

After the quantities of factors for a relevant range in output for each process have been established and the effects of different weather conditions have been ascertained, each process may be evaluated for the desired conditions with respect to price relationships, size and type of farm, and geographic locality.

II. *The Group Conference Method*

The Group Conference Method of studying agricultural problems as a basis for searching out and evaluating possible alternatives at various levels of program development and policy making is not new. Prior to World War II, this procedure was first used on a mass scale in connection with the land-use planning program of the United States Department of Agriculture. Much the same procedure was followed as outlined by Dr. Engene. A similar approach was used in the development and the execution of the production goal program for agriculture during the War. The Group Conference Method has been used effectivly in the development of long-time agricultural programs in a number of counties in North Carolina.

If we approach our research on the premise of a problematic situation that must be reduced to the relevant factual situation before solutions can be developed and appraised, the nature of the problem would determine the research method to be used.[2] Salter has suggested that "the problems of inquiry arise from problems in experience" in which the question posed is "What means, if instituted, will produce what consequence?"[3]

The Group Conference Method appears to have merit where speed or time is more important than objectivity. Its usefulness as a research method is limited. One would not expect to get a representative sample of opinions or facts by its use. Lack of objectivity may be another weakness. When individuals discuss problems in a group, a lack of independent judgment is likely to result. Then, too, not all problems are suited to the group discussion method of approach. Farmers may lack technical knowledge and experience regarding some problems, or the problem may be too complicated to lend itself to satisfactory group discussion. For example, the collection of input-output data for crop and livestock enterprises would be a tedious process with a group of farmers and might yield inaccurate data of little value.

As pointed out by Dr. Engene, the Group Conference Method does appear to be very useful in gaining a better understanding of problems and in determining physical obstacles to proposed solutions.

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[2] For a discussion of analysis of problem, see *The Logic of the Sciences and the Humanities*, by Northrop (Chapter II).

[3] *A Critical Review of Research in Land Economics*, Salter.

FARM APPRAISAL AND BENEFIT-COST ANALYSIS

Chairman: E. L. Butz, Purdue University

NEW DEVELOPMENTS IN FARM APPRAISAL FOR LOANS AND TAX ASSESSMENT*

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I. *Loan Appraisals*

THE major development taking place recently in appraisal for loan purposes is the annual revision of farm product prices used in calculating net income. Before the discussion of this plan in detail a bit of history on the subject is in order.

The depth of the depression in 1932-33 saw the emergence of an idea that many thought might become a permanent policy in appraisal practice. That idea was the selection of a more or less permanent price level as the basis of values. This "normal," as it was called, was considered as the level above and below which farm prices were expected to fluctuate. For a time, from 1933 through 1946, this "normal" concept received general acceptance because it gave, or at least to many of the students of the subject, appeared to give, good results. But by 1950 most of the former supporters of a fixed "normal" had reluctantly agreed that some other policy was needed.

Establishment of the fixed "normal" as a general policy came with the passage of the Farm Mortgage Act of 1933. In this act the Federal Land Banks were authorized to lend on the basis of normal agricultural value. In defining "normal," the Farm Credit Administration selected the price level of 1909-14 with certain modifications. In the 1946-47 annual report the following statement is given on normal prices and their use in appraisal for Federal Land Bank loans:

"Normal farm-commodity prices are those which may be expected to prevail on the average over a long period of years in the future. As a starting point in developing those prices, the period 1909-14 has been taken as representing normalcy, in so far as a general level of farm-commodity prices is concerned. Adjustments from this general level then are made in the prices of individual commodities, increasing those which have assumed a more favorable price position than they occupied during the 1909-14 period and reducing those which have attained a less favora-

* Journal Paper No. J-2025 of the Iowa Agricultural Experiment Station, Ames, Iowa. Project 1069.

ble position."[1] From 1933 to 1947, the Farm Credit Administration and the Federal Land Banks clung tenaciously to this price level in making appraisals. For example, the price of corn used was .50 to .55 a bushel for portions of the Corn Belt. No change in this price was authorized until 1951, although the fixed "normal" policy was definitely weakening in 1948 because the annual report of the Farm Credit Administration for 1947-48 omitted mention of the 1909-14 price level as normal. Although the change has not been given widespread publicity as yet, the Farm Credit Administration increased its price level in 1951, bringing the price of corn in the western Corn Belt up to .75 a bushel.

During the 1933-47 period in which the Farm Credit Administration was holding the line on its fixed "normal," insurance companies and other lenders were using various plans—some were using a "normal" like the FCA, others were using a moving average, and still others were merely following market prices up at a more or less conservative distance.

For a time during the forties, a group of lenders followed the moving average, favoring a 15-year moving average. Behind this idea was the belief that a 15-year span, kept up-to-date, would include the necessary low and high years to give a well balanced estimate of the future. In fact, this moving average with a fixed number of years was in the process of taking the place of the fixed "normal" when those who used this moving average began to run into trouble. For example, those lenders using a 15-year moving average of corn prices in 1948 were embarrassed in 1949 when they found that they would have to use a higher corn price average in 1949 than in 1948, even though corn prices were declining at the time. The moving average required the addition of the 1949 price and the subtraction of the 1934 price. But since the 1949 price was higher than the 1934 price, the average increased. One lender met this situation in 1949 by shifting to a moving average of a different length, one which gave him a figure which appeared more reasonable. This aspect of what appears "reasonable" strikes at the heart of the problem. A satisfactory average for 1951 may not appear satisfactory in 1952, 1953, or in some later year. As the future unfolds our estimate is invalidated.[2]

Selection or revision of a price standard for each year by a committee was a new development in the late forties in the United States. By this time, both the fixed "normal" and the moving average of a fixed number

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[1] *The 14th Annual Report of the Farm Credit Administration*, 1946-47, page 34.

[2] A penetrating and stimulating treatment of this question in which the concept of "normal" is severely criticized will be found in two papers by L. J. Norton. The first paper, "Some Fallacies of Normal Values in Farm Land Appraisals" was given at Farm Appraisal Conference, University of Illinois, June 15-17, 1948, and the second "Price and Yield Concepts in Land Appraisals" was given at Soil Management and Land Valuation Short Course, Iowa State College, June 5, 1951.

of years were recognized as not being satisfactory. In this new committee development, the Canadians pioneered with a committee set up in 1944 to issue standard price estimates for the use of appraisers. This price forecast or recommendation was a definite break with the idea that the price used should be fixed or tied to a moving average of a fixed number of years. Here was recognition that the price level to use in appraisal had to be revised as the developing situation warranted.

The Grain Prices Committee of the Appraisal Institute of Canada came forward with definite price recommendations for appraisers in 1944. For that year they recommended .93 a bushel for No. 2 Northern Wheat at Fort William. In 1946 they raised the price to .96; in 1947 to $1.03; and in 1948 to $1.12 a bushel. In 1949 and 1950 they recommended the same price as in 1948. Price recommendations were given for oats and barley as well as for wheat. In making these recommendation the Canadian Committee present reasons and evidence in the form of averages for the past, including as many as 40 years.[3]

Standard appraisal data for the United States were sponsored by the American Society of Farm Managers and Rural Appraisers.[4] The Society called for bids for the preparation of yield and price averages to be issued each year for the use of appraisers. The successful and only bidder was the Doane Agricultural Service of St. Louis, whose record of interest and support of improved appraisal methods is noteworthy. Their procedure in preparing standard appraisal data was, first, to collect all the pertinent yield and price data by states; and second, to select a committee from different sections of the country, which met in January 1950 to discuss the problem and to decide on a series of prices and yields as their recommendations for appraisers to use in 1950. Decisions as to prices were made on a national basis with appropriate variations made to fit the situation in the 10 states for which data were made available.

In January 1950 the committee decided upon a price level which on a national basis represented $.88 a bushel for corn, $1.15 for wheat, and $.20 a pound for cotton. This level, as it happened, coincided roughly with the 20-year average, 1930-49. But it should be emphasized that the committee did not decide on using an average, either fixed or moving, which it expected would hold good for a number of years. There was none of the fixed "normal" of the thirties or the moving average of a fixed number of years which gained prominence in the forties. Instead, here was a

[3] See Bulletins of the Appraisal Institute of Canada. Bulletin 22, for example, is entitled, *Grain Price Average for Farm Appraisals in Western Canada 1950* issued by Grain Prices Committee.

[4] See "Standard Appraisal Data," by True D. Morse, *Journal American Society of Farm Managers and Rural Appraisers*, Vol. XIV, No. 1, April 1950, pp. 43-48. Also see "Standard Appraisal Data," ibid, Vol. XV, No. 1, April 1951, p. 81.

price level considered to be the best future estimate for use in appraisal in 1950.

The committee met again in January 1951 to select the price level for 1951. Between the first and second meetings the outbreak in Korea had occurred and the defense production program of the United States had been enacted into law by Congress. With this background, the committee took a fresh look at the future. As reported in the April 1951 issue of the *Journal of the American Society of Farm Managers and Rural Appraisers* (page 81), "All members did not see the same danger and no one expected the price rise to be a steady line of advance without temporary breaks lasting for one to two years." The committee decision in January 1951 was to raise the price level approximately 20 percent. Corn, for example, was increased from $.88 a bushel in 1950 to $1.04 in 1951; wheat, from $1.15 to $1.40; cotton, from $.20 to $.23.

In 1951 the new level of prices selected by the committee coincided approximately with the 15-year average, 1936-50. Some individuals have taken this to mean that the committee has settled on the 15-year average as its recommendation. Although obviously not speaking for the committee, but only as one of its members, I can say that this was not my interpretation of our action. Our main decision, as I view it, was the selection of a price level not an average for a period of years. The fact that the 15-year average 1936-50 coincided with this decision does not restrict the committee to the use of this or any other average for later years. Moreover, the fact that the 20-year period 1930-49 was used in 1950 and the 15-year period 1936-50 was used in 1951 is indicative of the committee's desire to avoid either a fixed "normal" or a moving average.

What the decision of the committee will be for 1952, if it is called together to select a price level for that year, should in no sense be predetermined, but should be the result of the committee's deliberations with the best information available at the time. By operating in this manner, the committee does not become obligated for more than a year at a time to any price selected. This makes it possible to provide a sensitive barometer on future price estimates, and yet one that takes into consideration past influences and all relevant information bearing on future prices.

There are those who regret the inability to establish a fixed "normal" or a moving average, but in the world of today with decisions of world powers having such a significant effect on production and prices, there is no escaping the necessity of something like this annual revision of future price estimates.

There are several other developments in appraisal to be noted, although not of as much significance at this time as the question of price estimates.

These other developments include upward revisions in cost estimates used in figuring net income for loan appraisal purposes, and more widespread use of soil productivity ratings and pasture yield estimates. More attention deserves to be given to cost estimates. The work at Illinois, Purdue, and Missouri stands out as the type that could be expanded. On the use of soil ratings, the information being gathered currently at Illinois is outstanding.[5] For pastures, yield data similar to that developed at Purdue can be of great help to the appraiser who is endeavoring to value pasture land.[6]

Another development worthy of note is a new slant on an old problem, that of making satisfactory farm comparisons. Use of key or index sales as the basis for comparison has been advocated recently by a group of California appraisers. A discussion of this approach including comments on its limitations is contained in an article entitled, "The Appraisal of Farms," by W. D. Davis, in the *Appraisal Journal* for January 1951.

II. *Tax Assessment*

In the last 20 years a great many tax assessment studies have been made by agricultural economists. These studies almost without exception have brought out the almost universal tendency for over-assessment of low-value and under-assessment of high-value farm land. In this instance farm land is not unique, since similar studies for city real estate reveal the same tendency of over- and under-assessment.

One of the new developments is the growing practice to tie these farm tax studies in with an assessor's reassessment program. More effective results are being secured where the assessor helps in planning the study from the start and follows through by using the information obtained in making his reassessment. The North Central Regional Land Tenure Committee has a project under way which includes a study of this technique.

In Iowa a law enacted in 1947, setting up an appointive county assessor system in place of elected township assessors, made this approach to assessment research more feasible than before. In fact, county assessors in some cases have asked for help in carrying out sales ratio studies of their own with whatever assistance the staff at Iowa State College could give them. Important points that have to be emphasized in these joint projects are carefully stated rules about which sales are to be included and which sales excluded, establishment of the bona fide character of the sales by verification from one of the parties to the sale or a real estate broker

[5] "How Valuable are the Soils of Central Illinois?" W. N. Thompson and P. E. Johnston, *Illinois Farm Economics*, No. 192, May 1951, pp. 1161-5.

[6] "What is the Market Price of Pasture?" Paul Robbins, *Journal of American Society of Farm Managers and Rural Appraisers*, Vol. XIV, No. 2, October 1950, pp. 116-118.

familiar with the sale, and specific standards for the selection of a sample including both the time and area covered. A detailed set of instructions for carrying out a sales ratio study along with an explanation of statistical analysis was issued in July 1950 by the National Association of Tax Administrators in a mimeograph statement entitled, "Preliminary Report of the Committee on Sales Ratio Data and Guide for Assessment Ratio Studies."[7] This report, which follows closely the methods used in the State of Illinois, gives specific directions on the sales to include and those to exclude. It also presents a strong case for the use of the median in averaging the data and for the coefficient of quartile deviation to indicate the dispersion of the ratios around the median. Illinois has had a great deal of experience with assessment sales ratios as a result of legislation requiring an adjustment in the millage levy based on up-to-date studies of the relationship of assessment to sale values. E. L. Maynard, in charge of these assessment-sales ratio studies for Illinois, was chairman of the committee which prepared the sales ratio report for the National Association of Tax Administrators.

Those assessors who have made sales ratio studies in Iowa are using them in connection with the next quadrennial assessment of real estate, which comes in 1953. One of the assessors, Richard A. Cherney of Grundy County, who made a ratio study of sales for 1949-50 for this purpose, has found the results so helpful that he is keeping a current check on ratio of assessment to sale price on all sales as they are reported. He made the following statement about the sales ratio in a letter in 1950 to the writer:

> I have found the sales ratio a very valuable tool for the assessor. After working with this ratio and using it I would not be without it. Its greatest value is as a means of establishing a factual level of assessed value—31.7 percent of current farm selling price in Grundy County. This percentage enables us to convert assessed values into current selling prices or vice versa, which is an excellent means of checking the accuracy of the assessment. Also this ratio study has made it possible to compare the level of assessed values for urban and rural properties. This is difficult to do by any other method than the sales ratio.

Mr. Cherney also goes on to point out the advantage of the assessment sales ratio in making comparisons between counties. A statement like the above from a county assessor may seem almost too good to be true, but Mr. Cherney has authorized me to invite any of you who would like further information to write to him, or come to his office in the Court House in Grundy Center to see for yourselves.

In substance, this assessment-sales ratio approach is a combination research extension activity. It has merit in short-cutting the process of

[7] National Association of Tax Administrators, 1313 East 60th St., Chicago 37, Illinois.

getting research results and having them used. Furthermore, the assessor and his staff, who are the principal individuals able to improve the assessment, are much more likely to make the desired changes if they have had at least a part in the computation of the ratios and their classification.

A sales ratio study can be helpful in checking the effectiveness of a reassessment. In a check of this kind it must be clearly recognized that a uniform relationship of assessment to sale value is the objective of the assessment system. A perfect correlation, however, would not necessarily be ideal even if the objective were a uniform percentage of sale value, because sale values themselves are not consistent. Simultaneous bona fide sales of what are regarded as similar properties may vary because of differing attitudes regarding the property by the parties to the transactions. Besides, no two pieces of real estate can be exactly alike, so that there is always likely to be some difference of opinion, even though slight, regarding the quality of the real estate.

For Story County, Iowa, farm sales ratio studies are available for a period before and after an extensive reassessment in 1949. An unusually successful result was achieved in so far as removal of over- and underassessment was concerned. The results of these studies carried out by the Iowa Agricultural Experiment Station are presented in Table I.

TABLE I. FARM ASSESSMENT-SALES RATIOS—STORY AND ALLAMAKEE COUNTIES, IOWA 1936–37 AND 1949–50
Classified by Sale Price

Sale Price Groups	Story		Allamakee
	1936 1937	1949 1950	1949 1950
1. Highest one fourth of sales (per acre)	51%	28%	37%
2. Second one fourth	55%	28%	42%
3. Third one fourth	71%	31%	52%
4. Lowest one fourth	91%	32%	66%
Average Ratio	67%	30%	45%
Average Price	$99.57	$217	$80
Number of Sales	250	140	107

Source: Iowa Agricultural Experiment Station.

Another popular new development in the rural assessment field is the key farm approach to assessment. In essence, the procedure consists in a detailed appraisal of sample or representative farms throughout the areas to be assessed. Agreement on the assessment of these bench-mark farms is reached among the assessor's staff, and even among the board of review members and interested citizens, before the assessment of the whole area is started. When agreement on the key farms has been reached, the assessment is carried forward with the key or bench-mark farms as the standard or reference.

Key farms are especially useful where an assessor has a number of deputies or fieldmen working under him. By requiring that all of his staff become familiar with the key farms, he is able to keep the assessments more nearly uniform than any amount of written rules and regulations would provide. Moreover, whenever a member of the assessment staff is in doubt on a property, he can compare his tract with the key unit most nearly like it. In the reassessment of Story County noted in Table I, a key farm system was used.

A detailed description of assessment using the key or bench-mark system is described in an article by Rex R. Bailey, entitled "Appraisals for Tax Assessment" in the April 1949 issue of the *Journal of the American Society of Farm Managers and Rural Appraisers.*[8]

An interesting development of recent years is the use of land classification in assessment. Here again agricultural economists have been doing excellent pioneering work. Studies in Alberta and Saskatchewan by C. C. Spence, E. C. Hope, G. H. Craig, J. Coke, A. Stewart and W. D. Porter, have come to my attention.[9] Physical data have been converted into economic classifications in these reports, with improved tax assessments as one of the objectives for use of the data. Land classification as an aid in tax assessment has received increasing attention in the United States in recent years. The work in Montana has been significant.[10]

Still another recent development in assessment consists in the transformation of soil survey data into assessment values, land classifications, or economic ratings through the use of custom charges for farm operations. In effect, the method is for the most part the substitution of custom rate procedures for the familiar landlord share method of estimating income producing ability of a tract of land. The reason for this substitution, at least in some cases, is the growing practice of custom operations among farmers where some have expensive farm machines and are able to use them in doing custom work on neighboring farms. A somewhat similar method of evaluating soil for assessment purpose has recently been developed at the University of Nebraska by Quentin W. Lindsey.[11] In the development of his method, however, Mr. Lindsey used costs incurred by the farm owner-operator in place of custom charges.

The custom rate method of converting soil data into economic ratings is being followed in Allamakee County, where the county assessor,

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[8] Vol. XIII, No. 1, pp. 36-42.

[9] See Technical Bulletins Nos. 16, 36 and 39, Dominion of Canada—Department of Agriculture, Ottawa, Canada.

[10] See *Procedure for Land Reclassification in Montana* by H. G. Halcrow and H. R. Stucky, Mont. Agr. Exp. Sta. Bul., 459, 1949 and *Proceedings of Land Classification Conference at Great Falls, Montana,* June 21-24, 1950. No. Great Plains Agr. Adv. Council and Farm Foundation, Chicago, Ill.

[11] *A Procedure for the Equitable Assessment of Nebraska Farm Land.* Nebr. Agr. Exp. Sta. Bul. No. 400, Dec. 1950.

A. L. Hansmeier, asked for help in using a recent soil survey in making a reassessment of the county. A sales ratio study for 1949-50, in which Mr. Hansmeier participated, indicated gross over- and under-assessment as shown in Table I. As a first step in the assessment aerial maps on an eight-inches-to-the-mile scale were obtained and the soil survey boundaries were drawn on the maps. Then the maps were cut into 40-acre tracts, the unit for assessment as required by Iowa law. All of these aerial soil maps, containing 40 acres or fractions of this acreage, were pasted on a regular assessment card on which such information as the classification of the soils, division of the land into crop, permanent pasture and timber was recorded. Each of the soil classifications was multiplied by the economic rating to give an over-all soil rating for the tract.

The economic rating for each soil was obtained by figuring the gross income and then the net income of the individual soil. In these computations 100 acres of the soil are used and the costs are figured on the basis of custom rate charges for the different crop operations. For example, a Fayette silt loam with a slope of from four to seven percent is estimated as being suitable for corn 34 percent of the time, for oats, 33 percent, and for hay, the remaining 33 percent. The yields for this Fayette silt loam are estimated at 54 bushels for corn, at 36 bushels for the oats, and one ton for hay. With prices of $.95 a bushel for corn, $.55 for oats, and $10 a ton for hay, the average gross income per acre of the rotation amounts to approximately $27.25 an acre. The custom rates for growing an acre of corn are estimated at $13.60 an acre, of which plowing is $2.50 an acre, cultivating $3.00, and picking $3.60. Oats figures at $12 an acre and hay $10.10, plus $.75 an acre for lime and fertilizer. The average custom charge per acre for the rotation comes to approximately $15.75. Subtracting this cost from the gross income of $27.25, we get a net income per acre of $11.50.

The best soil in the county which has a net income of $20.50 an acre is given an economic percentage rating of 100. This gives the Fayette silt loam of four to seven percent slope with a net income of $11.50 an acre an economic rating of 56. Should a soil still better than that given 100 be found, it could be given a rating proportionately above 100.

In order to get a final rating for a farm it is necessary to make additional adjustments for road type, location with respect to town, and similar factors. Buildings, including the house, are assessed. However, buildings are shown separately and added later to the land in the assessment procedures of most states. In the final phase of the reassessment in Allamakee County, a key farm system is being set up to insure uniform results throughout the county and to make certain that the individual assessed values for 40-acre tracts are in line with over-all values of land and buildings considered as a unit.

BENEFIT-COST ANALYSIS OF RESOURCE DEVELOPMENT PROGRAMS

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THE President's Water Resources Policy Commission in its recent report to the President set forth a number of recommendations with respect to the economic evaluation of proposals for the development of water resources.[1] This Commission recommended (1) that Congress should direct all agencies to apply the same standards and methods of evaluation; (2) that evaluation procedures should be revised to apply to multiple-purpose basin programs, and to projects only as constituent parts of such basin programs; and (3) that the evaluation procedure should consist of, first, a measurement of direct benefits and costs; second, a standard method of taking into account secondary benefits and costs; and third, the assignment of values to public benefits and costs that affect the general welfare.

In this paper we point out what appears to us to be some implications of this latest document on the scope and purposes to be served by economic evaluation in connection with resource development programs. We also explore gaps in the Commission's recommendations and indicate the extent to which progress has been made in filling these gaps, including an examination of some of the major problems in developing and applying appropriate techniques and procedures of economic evaluation in the public interest.

It may seem incongruous to most economists that serious questions should be raised about the usefulness of economic evaluations. But ardent workers in the fields of conservation and development of natural resources have questioned whether economic studies in these fields serve the public interest. Although the types of effects taken into account may differ, the way in which economic evaluation can advance the public interest is basically much the same as the way economic studies assist prudent private investors. As Professor Grant put it so well in his text on engineering economics, economic evaluation answers these three major questions: Should the project be undertaken at all? Should the project be built now? Should the project be built in this way?[2]

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* The views presented in this paper are the responsibility of the authors and should not be construed as representing official policy.

[1] The President's Water Resources Policy Commission, *Water Policy for the American People*, Vol. I, Washington, D.C. December 1950.

[2] Eugene L. Grant, *Principles of Engineering Economy*, Ronald Press, New York 1950.

Legislative Evolution of Economic Requirements

So that we may more fully appreciate the implications of the Commission's recommendations, let us briefly review the gradual development of program evaluation to the stage presently employed by the major federal agencies engaged in development of land and water resources. In the first instance, it appears significant to note that the Federal Government's activities in resource development have never been predicated on the basis of a strict accounting of costs and returns. In other words, the Federal Government has not launched into resource programs strictly on a business basis for the sake of profits for the Federal Treasury. But it is equally significant to note that most of the major Acts of Congress establishing and authorizing water resource projects have required some degree of checking and weighing the economic values involved in achieving the public welfare and other Constitutional goals of the respective developments. The Reclamation Act of 1902 provided that the Secretary of the Interior should ascertain whether a contemplated irrigation project was practicable and advisable before letting the contracts for its construction. Primary assurance for meeting this requirement was through reimbursement by water users. This repayment requirement did not establish over-all economic feasibility as a necessary requisite. However, it did establish a standard which, in a sense, can be more severe in its application than a showing that benefits (to whomsoever they may accrue) are in excess of costs, as required for flood control projects. The Reclamation Act of 1902 provided that charges for the use of the water should be determined with a view to returning to the Reclamation Fund the project's estimated cost of construction, and that the water-user should complete the repayment within 10 years.

Present-day irrigators find the repayment provisions far more lenient than those of nearly a half-century ago. Gradually greater flexibility and longer periods of reimbursement were provided in a number of ways under various acts supplementing and amending the Reclamation Act of 1902.[3] A further modification of repayment requirements has emerged

[3] For example, the repayment period was extended to cover a 20-year period under the so-called Extension Act of 1914, the same year, incidentally, in which Congress passed the Smith-Lever Act, which laid the foundation of the cooperative federal-state extension service. This revision in the reclamation legislation provided for 15 annual installments and for a five-year delay after the initial installment. At present, the repayment requirement has been spread over the first 40 years following a 10-year development period. Specific project legislation and proposals would extend this repayment period even further. The bill allowing construction of the Weber Basin Irrigation Project, for example, provides for extension of the repayment period to 60 years. (Public Law 273, 81st Congress, 1st Session.) A second method of reducing the repayment obligations of the water users was employed in the Adjustment Act of 1926, wherein the reimbursable costs on a number of operating projects were reduced by flat amounts.

in multiple-purpose projects in recent years through methods used in the allocation of joint costs. The usual method applied allocates an amount of the project costs equal to benefits to purposes for which no reimbursement is required, with a substantial part of the remaining cost reimbursed through power revenues. The result is to minimize the net allocation to irrigation—in effect, a further liberalization of the original repayment standard—and to reduce the effectiveness of the original repayment standard as a basis for determining the economic justification of federal reclamation projects.[4]

With respect to other types of water resource developments, Congress has also established economic standards to which the responsible agencies should adhere. Prior to 1936, Congress had directed that recommendations for navigation and flood control projects should contain full information regarding the present and prospective commercial importance of the projects and their probable commercial benefits, as well as a statement of the benefits that would accrue to the localities affected by the improvement. These requirements were quite general as compared to the reimbursement requirement. In the Flood Control Act of 1936, Congress first established economic feasibility as a definite condition for federal participation in the improvement of navigable waters and their tributaries for flood control purposes. This act applies not only to the Corps of Engineers, but also to the Department of Agriculture, which, for the first time, was given responsibility for watershed treatment projects in the interest of flood control.

Although the Congress has made increasingly clear, through a considerable volume of legislation, that resource projects must be economically sound, it has not pursued a strictly consistent policy with regard to economic evaluation; nor has it established a uniform policy with regard to standards upon which evaluations should be made. The detailed application has been left for administrative determination by the agencies to which the responsibility of carrying out the projects has been assigned.

Need for Uniformity

Recognition of the need for consistent evaluation practices led to the

[4] As provided in the Reclamation Act of 1939, a portion of the project costs can be allocated to any flood control and navigation purposes that are served by the project works. A further provision of this same type was adopted by a 1946 statute by which a like allocation can be made to the preservation and propagation of fish and wild-life. A number of bills introduced into Congress in recent years would extend considerably farther the allocation of costs to such non-reimbursable purposes as general welfare, national defense, recreation, salinity and sediment control, improvement of public transportation, protection of public health, and fulfillment of international obligations (H.R. 1770, 81st Congress, 1st Session, a bill to amend the Reclamation Project Act of 1939).

establishment of the Benefit-Cost Subcommittee of the Federal Inter-Agency River Basin Committee.[5] Since its establishment in 1946, the Subcommittee has been engaged in a comprehensive study of benefit-cost problems, with primary emphasis on developing uniform practices. As stressed in the report of the President's Water Resources Policy Commission, the procedures and techniques currently employed by the several federal agencies vary sufficiently to preclude adequate comparison of projects. There seems little doubt as to the general acceptability of the Commission's recommendation that all agencies should employ uniform standards and methods of evaluation. As indicated, the principal resource agencies are aware of the need for uniform standards, and progress is being made in the development of mutually acceptable standards. Although the Commission's recommendations provide an added incentive for this type of cooperative effort, their report does not spell out the standards that should be employed.

Other groups have traveled much farther in the direction of formulating standards for specific evaluation problems. The Commission has recognized, in particular, the contribution made by the Subcommittee on Benefits and Costs.[6] The Commission recognized the need for working out detailed procedure and techniques for evaluation of project benefits, but in lieu of resolving the many problems of economic measurements, they suggested the assignment of the task to a Board of Review. For the basic approach, the Commission advocated that projects be evaluated on the basis of their contribution to national income. But they did not indicate how such an approach should be undertaken, nor did they establish the essential assumptions underlying such an approach. We refer here to the assumptions that must necessarily be made as to the income from the various activities arising out of or stimulated by specific resource projects, as compared with alternative investment opportunities. Nor did they indicate the method by which enhanced recreational or esthetic values and other intangible benefits would be measured in this "national income approach." Although the Commission accomplished a formidable task in a very short time, it should be clear that much work remains to be done before the application of uniform and acceptable evaluation standards can become the common practice of all agencies that have responsibility for water resource developments.

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[5] Voluntary committee created through a Memorandum of Agreement in 1943, and now consisting of the Departments of the Army, Interior, Agriculture, and Commerce, the Federal Power Commission, and Public Health Service. The Subcommittee on Benefits and Costs prepared a series of reports on current practices, and finally one on proposed practices, which is now in process of revision, to take account of participating agency comments.

[6] *Proposed Practices for Economic Analysis of River Basin Projects*, May 1950.

Economics of Project Formulation

At this stage, we are more concerned by the apparent lack in the Commission's report of a clear conception of the function of benefit-cost analysis in determining the character and scope of resource developments —either the best balance of project features within a single project, or the best balance of several constituent projects in a comprehensive program. The optimum scale of development, as indicated by economic analysis, can only be established by arriving at the proper relationship not only of phases within a project, but also among a number of projects considered as incremental parts of a comprehensive program. Incremental analysis on the basis of costs and returns is a fundamental economic principle to which the Commission gave too little emphasis.

The application of an incremental approach is essential to the establishment of the optimum scale of development. By this approach we can go a long way toward achieving the goal of maximizing net benefits from a given project or from the investment of the limited amount of funds available for resource developments. Projects so designed would include all features that add benefits in excess of separable costs, with the total benefits of all features greater than total costs.

Under this approach, the degree of intensity of each feature is carried to the point at which marginal benefit-cost relationships are in balance. With the role of economic analysis recognized and the use of sound economic principles brought into project formulation, it seems to us that many of the questions that now plague us with respect to the financial and economic feasibility of projects would be resolved. If, for example, economic analysis is brought into play to achieve the optimum balance between purposes that are served by multiple-purpose undertakings, then many of the problems of joint cost allocation can be resolved equitably and understandably on the basis of relative net benefits accruing to each purpose. This is assuming that uniform basic standards of measuring values would be employed throughout project formulation, in the allocation of joint costs, and in establishing prices or other levies on the consumers of project services.[7]

The function of economic analysis in designing single projects or basin programs is a crucial issue. A realization of the place of economics in the formulation of projects too often has been largely overlooked in their design. It is particularly regrettable that the role of economics in this respect was not made clear in the report of the Water Resources Policy

[7] For comprehensive study of the controversial and complicated problems of joint cost allocation, see J. S. Ransmeier, *The Tennessee Valley Authority*, Vanderbilt University Press, 1942: Report of Subcommittee on Benefits and Costs to Federal Inter-Agency River Basin Committee, *Proposed Practices for Economic Analysis of River Basin Projects*, Chap. V: and *Water Policy Commission Report*, Vol. I, Chap. V.

Commission. In too many instances, projects are conceived and designed simply on the basis of their physical potentialities for utilizing to the limit available physical resources. Then, after the project is set up, the economist is invited to come in to show whether the plan is economically feasible. The amount of genuine guidance that economic analysis can provide in decisions affecting the public interest at this stage of project development is often quite limited.

Principal Measurement Problems

Establishment of appropriate benefit and cost concepts, as well as those of project formulation and design, as discussed up to this point, is only the initial phase of economic analysis. In order to apply such concepts in defining the optimum scale of development, succeeding phases require methods and procedures for measuring effects in comparable terms. Project effects arise in diverse physical forms, at differing times and for varying periods. In some circumstances the certainty of their occurrence is doubtful. Systematic treatment should be applied to such types of diverse effects as secondary benefits, inundation impacts, and intangibles. The full scope of measurement problems and standards is beyond the limits of this paper, in which we are primarily concerned with certain of the broader issues.[8]

In attempting to measure effects to whomsoever they may accrue, the standards appropriate from a public viewpoint may frequently vary from those considered acceptable from the viewpoint of an individual. Often there may be no adequate measure of social values for certain types of effects. The market price system provides the only suitable mechanism for placing monetary values on goods and services, and it must necessarily be the primary basis of evaluation in spite of its possible limitations in reflecting values from a public viewpoint. In so far as possible, extra-market effects should be given values derived from the exchange process, with any remaining effects treated as intangible.

Project values, although expressed in prices as determined in the process of exchange, should be measured mainly in dollars of constant worth rather than the fluctuating purchasing power characteristic of market prices. Similarly, discount rates and risk allowances considered appropriate for indicating value to society may depart from those acceptable to beneficiaries as cost bearers. The customary practice for individuals likewise may often be at variance with the evaluation procedures necessary in treating taxes, ownership transfers, secondary benefits, and other situations that involve compensatory offsets for which allowances may appropriately be made from a social viewpoint.

[8] For a more thorough discussion of many of these problems, see *Proposed Practices for Economic Analysis of River Basin Projects*, op. cit.

The complications and difficulties in making appraisals from the viewpoint of society as a whole are obvious. Aside from cases in which the justification for a departure is clear, standards and practices must be geared to those customarily recognized and acceptable to the individuals or groups affected.[9] When participation by private interests is involved, the acceptability of the standards becomes increasingly important.

Price Levels

An early step required in project evaluation is the projection of prices that are expected to prevail over the period in which project effects are expected to occur. The projection problem is not avoided by the use of historical or current prices; actually this constitutes a forecast that such prices will prevail over the life of the project.

Many of the major forces likely to cause future changes in price relationships are subject to analysis during the period of project appraisal. When the effect of such forces is taken into account, price projections provide a better basis for future project values than unadjusted extensions of current or historical prices.

Forecasts of the dollar prices actually expected to prevail at the time of benefit or cost occurrence are not necessarily essential. It is more important that the projections reflect the relative worth of goods and services under the resource employment conditions expected during the period of installation and operation of the project. With a high average level of resource employment expected to prevail throughout the life of a project, primary emphasis would be on the "real" values of the goods and services, as measured by their purchasing power. Under such conditions, proper evaluation of projects requires comparisons of the purchasing power of the goods and services invested with that of the goods and services produced, each measured at time of occurrence.

Emphasis on real values eliminates secular trends in the general price level as a factor in evaluation. The expectation of inflationary price trends should have little or no significance in determining justification from a public viewpoint. With stable levels of resource employment, the expectation of deflationary price trends would also be eliminated from consideration in analyzing economic justification.

Relative values in terms of purchasing power, however, cease to be a sufficient single basis for pricing project effects, if account is to be taken of the added social values of projects constructed during periods of underemployment of resources. Use of the purchasing power concept (of value) is largely neutral, with regard to the effects construction of the project may have on the national economy under varying levels of

[9] J. M. Clark, *Economics of Public Works*. National Planning Board, 1935, p. 5.

economic activity. In order to take account of varying resource employment conditions, some recognition must be given to fluctuations in dollar values. Past movements in the general price level have corresponded with fluctuations in employment levels. Although not a precise measure, such prices have been indicative of variations in the social worth of economic resources under different employment conditions.[10]

The pricing procedure for valuing project goods and services should take account of both purchasing power values and variations in resource employment. For projects undertaken under conditions such as those of the present, satisfactory price projections for deferred effects should, in our opinion, be at a general price level somewhat under the present level, in order to reflect the likelihood that average future levels of resource employment may be somewhat under those currently prevailing. Investment costs would be calculated at prevailing prices, with deferred benefits and costs estimated on the projected basis. Evaluations on such a base would allow a modified type of comparison of purchasing power, adjusted to reflect the expectation of a moderate decline in employment.

When analysis is made of projects for which the time of development is unknown, appropriate estimates would be in terms of projected prices for both costs and benefits. This would meet the purchasing power relationship requirement, and no adjustment for employment conditions would be needed until the probable time of development was established. Also, this basis would facilitate comparison among projects, would provide a uniform base for the formulation of interrelated basin programs, and comparison with the ratio based on current installation costs would be indicative of the favorableness of timing.

Various minor adjustments include conversion to a regional or areal basis; adjustments to reflect possible effects the project may have on the price of particular products, and its possible effects in causing a shift from a deficit to a surplus-producing area. Further, we need to recognize that such price projections require suitable modification in establishing fixed contractual obligations to be repaid by users of project services.

Risk Allowances and Interest and Discount Rates

Interest and discount rates and risk allowances are a means of converting to a common basis in time and degree of certainty the values of an-

[10] As the area of both government and privately administered prices expands, the general price level may become less sensitive to changes in employment conditions. In this event, the general price level would cease to function as an indicator of resource values associated with variations in levels of resource employment, and other methods would need to be devised for taking account of such variations in project evaluation. These might include direct adjustments in the values attached to resources that might otherwise be unemployed; or greater emphasis might be placed on the extended effects throughout the economy when projects were undertaken during low-level employment periods.

ticipated benefits and costs at their accrual. Both time and risk are usually reflected in prevailing interest rates, with the wide range in such rates chiefly a measure of difference in risk.

Allowances for risk and uncertainty take account of the hazards that may occur between the investment of resources and the accrual of benefits, and specific allowance may be made for many of the risks associated with a project. To the extent that this is done, the primary function of the interest or discount rates is that of adjusting for time differences and for residual risks and uncertainties. Usually specific allowances are insufficient to take full account of risk and uncertainty, and some residual risk component needs to be included in the discount rate.

So long as alternative opportunities exist for yields from capital investments in excess of that needed to meet risks and amortize costs, interest is as necessary in the allocation of economic resources as other prices. Whether measured from a public or private viewpoint, such a cost is involved. It stems basically from a condition in which the supply of investment funds is short of the amount needed to provide for all opportunities to utilize capital.

The interest rate on long-term government bonds is often used as a measure of the minimum risk opportunities available for capital investment. The objection has been made that, as a measure of social time preference, such a rate is inappropriate on the grounds that it is influenced by individual time preferences that may not fully reflect the interests of society. The real social cost of the use of capital, whether by individuals or the public, is its productivity in foregone alternative uses. Hence, a rate that supposedly reflected only the preference of society for present as compared to future goods would often fail to measure the full cost of the use of capital. In order to justify the use of a public time preference rate, the supply of capital available for investment would have to be sufficient to lower its marginal productivity to balance with the social time preference rate. With capital utilization costs established by foregone productivity opportunities, any allowance in social preferences between present and future goods would need to be reflected in higher prices attached to goods accruing in the future.[11] In the interest of both objective and systematic measuring procedures, such an approach is preferable to that of reducing the interest or discount rate below its productivity in alternative opportunities.

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[11] A way of making further provision for the possibility that future needs may exceed currently apparent expectations might be through the establishment of a contingency reserve that would be available if and when required. Although the use of such an approach might indicate the need for current investments to prevent the depletion of certain types of resources, it might also indicate the desirability of deferring development of resources of the type subject to exhaustion.

A principal reason for the relatively risk-free government borrowing rate (in terms of money—even though not in terms of purchasing power) is the security provided by the general taxing power. Modifications would still be necessary to reflect degrees of certainty attached to particular projects. The allowance to be added to the minimum risk implicit in the government borrowing rate and included as a risk component in the discount rate is largely a matter of judgment. Consideration would need to be given the allowances for risk and uncertainty in other phases of the evaluation. Attention must also be given the peculiarities of the particular project or program and the reliability of the physical data estimates.

Period of Analysis

From an economic viewpoint, most projects and programs have a limited economic life. The limit is established at that point in time at which the costs of continuing the project exceed the benefits expected from continuation.

Although economic life establishes an upper limit on the period of analysis, it may often be desirable to select a period short of such a limit. In some cases, the period of analysis may be geared to the expected productive life of the major initial structure. In case of a need for continuing service, the replacement decision can be made later and is not an essential part of the initial formulation or evaluation of the project. The expected economic life, moreover, may extend through several successive replacements of major elements of a project.

Limitations on the reliability of estimates for the distant future and their small present worth compared to initial investment costs are reasons for limiting the evaluation period. The adoption of a limited period of analysis requires the amortization of net capital investment costs and the establishment of a basis for estimating salvage. With the use of interest and discount, variations in the period of analysis beyond 75 or 100 years would have only a minor effect on project evaluation.

Other Measurement Problems

The measurement of a number of other elements in project evaluation involves difficult decisions. Among these are secondary and extended effects; inundation and other consequential damages of project construction; social costs of removing land from production and displacement of existing facilities; possible adverse effects on ultimate potential developments; extent to which alternative sources for supplying project services should be brought into the analysis; treatment of taxes, recreational, and esthetic values; and the relative weight to be given intangible effects.

The lack of precise measurements for certain of these elements does not preclude effective use of benefit-cost analysis, even though the proportion

of total project effects subject to quantitative analysis is thereby reduced. A principal problem in measuring many of these elements stems from the difficulty of estimating the difference in net social effect after all cancellations and offsets are brought into the analysis. The general solution often lies in finding a uniform basis for including in the comparison allowances for like effects of available alternatives. This requires taking into account the possibility of similar effects from other activities expected in the absence of the proposed project. Allowances of this type are a basic problem in estimating the net secondary benefits that might be assigned to the project under examination. In determining net secondary benefits, deductions should be made not only for resources directly used in secondary activities, but also for probable similar secondary effects from alternative uses of resources required for the project. The use of reasonable assumptions with respect to alternative uses of resources would indicate that net secondary benefits usually are fairly limited in relation to direct benefits.

A similar problem arises when the evaluation requires an estimate of net social costs. The cost of land acquisition, for example, often may fall far short of adequately measuring the social cost of removing land from production. On the other hand, the cost of private facilities acquired for project operation when use is not changed involves no net social costs. Project cost for compensation to individuals or groups adversely affected, and a major part of the payments in lieu of taxes arising in connection with some of these elements, must be distinguished from the net social effects of the projects.

An additional problem stems from the absence of market values for certain project effects. A partial basis for treating intangible values, for which there are no market criteria, involves a determination of the project costs that are added in order to produce such intangible effects.

Investment Program Ahead Requires Sound Evaluation

Use of reliable economic measurements from the start in formulating projects would contribute materially toward answering many questions. Some of the questions would be eliminated. Use of these measurements would provide a basis for determining the level of subsidy that might be required to accomplish a particular purpose. It would help also to determine the beneficiaries of the subsidy and those who bear the cost of the subsidy—whether obvious to them or not. To illustrate, let us assume that we have a project with a possible major purpose or principal feature in question. Assume further that we find by our incremental analysis that added benefits from the feature in question do not offset the added costs. On the basis of economic analysis, obviously the feature should not be

added. Nevertheless, if the feature is considered a desirable addition to the project, it should be clear that it has been added because of a policy decision and not upon economic grounds. If it should be added in the interest of the general welfare, for example, the amount of the cost that cannot be returned through benefits might best be appropriated from the general treasury and not charged against other purposes of the project, or obscured in a "basin account." From the point of view of the national economy, it is important that the financial and economic status of any particular feature of public resource projects be clearly understood and plainly visible.

Let us add, however, that the size and nature of resource developments that are in the best long-run interest of the American people are questions that cannot be completely resolved on the basis of economic analysis. We argue strongly for its proper place, but at the same time we must acknowledge that other factors may need to be considered. Many policy matters involve more than economics. We should try to distinguish more clearly than we now do between questions of policy and questions of economics. We do not seem to be able always to keep policy separate from questions of economic criteria, and we are thereby not only needlessly confused, but also in danger of undertaking resource developments upon false assumptions.

Economic soundness is necessary in the development of resource program that are acceptable to the people of the country—programs in which farmers and others will participate, and that the taxpayers are willing to pay for. As a matter of national policy, we can and do give consideration to many things that are not reducible to economic terms. National policy, for example, might dictate that at least a certain amount of reclamation of land resources will be undertaken annually. In pursuing such a policy, projects with adverse benefit-cost ratios may sometimes have to be constructed, but, even in such instances, benefit-cost analysis would help in the selection of the most advantageous project from the available alternatives.

The questions with which we have been concerned in this paper are more than academic. The pre-Korean fiscal year 1951 Federal Budget for the development of water resources was 1.3 billion dollars. To this figure we should add the cost of the land conservation and forestry programs, which make the total somewhere around 1.75 billion dollars, as representing the current expenditure rate for conservation and development of land and water resources. If recent trends are an indication, we may expect continuous expansion in public expenditures for resource projects. From 1947 to 1951, the annual rate of federal investment in the Nation's resources trebled. For water project structures, the ultimate in-

stallation cost will probably exceed 100 billion dollars, according to estimates presented in the report of the Water Resources Policy Commission. If the proposed comprehensive agricultural plan for the Missouri Basin is used as a basis for a national estimate, the ultimate cost of installation from public and private sources would exceed 40 billion dollars for land conservation and watershed treatment measures.[12] For just the watershed treatment planned for flood-control and erosion-prevention purposes, the indicated cost will range between 10 to 15 billion dollars. These investments represent only present plans. Plans in the making could expand the magnitude many times. Such tremendous investments call for thorough-going economic analysis.

DISCUSSION

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Dr. Murray's paper is divided into two parts—loan appraisals and tax assessment. My discussion will be confined to the first part.

Dr. Murray and I agree on the general principle of using "reasonable" prices for appraisal purposes rather than "normal" or a moving average. At the committee meeting in January 1951, he and I were not in complete agreement as to what was "reasonable." It was my opinion that there were so many inflationary forces in the picture that use of average prices for the last 10 years would be "reasonable." The 15-year average price of corn in Illinois was $1.05. The 10-year average was $1.26. The average for the five years, 1946-50, was $1.52. The corn loan rate for the 1950 crop in central Illinois was $1.47. It appeared to me that a conservative price for appraisals made in 1951 would be around $1.25 per bushel. Dr. Murray and some other members of the committee were even more conservative.

I wish to emphasize that the point on which Dr. Murray and I disagree is the question of the exact price to be used, and not the basis on which the price is to be determined.

I would like to discuss a little further some of the history of the normal value concept and some of the differences of opinion concerning it. For the last three years I have had my class in Farm Appraisal read some different opinions on this subject. In December, 1946, R. C. Engberg of the Farm Credit Administration read a paper at the annual meeting of the American Farm Economic Association. Dr. Engberg stated that "The normal value concept is likely to be recorded by history as one of the greatest single improvements in the technique of making appraisals for farm mortgage loans."[1] In Dr. Murray's second edition of *Farm Appraisal,* published in 1947, he makes the following statement: "Of all the possible selections, the weighted moving average and the arbitrary choice of a fixed base or normal appear to have an edge over the others."[2]

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[12] House Document No. 373, 81st Congress, 1st Session, *Missouri River Basin Agricultural Program.*

[1] R. C. Engberg, "Federal Agencies as an Influence Upon Land Values," *this Journal,* February, 1947, page 151.

[2] W. G. Murray, *Farm Appraisal,* page 141. The Iowa State College Press.

After having read these two ideas, the students were inclined to think that the normal value concept had a real place in farm appraisal. The next reading on the list was a paper by L. J. Norton which includes the following statement: "I submit that, since no one knows the future level of prices, no one can make any valid, practical use of normal value."[3] After a thorough discussion of the subject we agreed to go along with Norton's conclusion.

It would be well if we looked at the farm appraiser's job in order to get a clearer picture of the place of this price question. As I see it, the appraiser's job is as follows:

1. Describe the property completely and accurately:
   (a) Physical description,
   (b) Productive capacity.
2. Give his opinion as to the value of the property, including a definite statement of the line of reasoning followed in arriving at the value.

The price question concerns the estimates of productive capacity. In order to make a complete statement of what a farm will produce, some level of prices must be used. I know of no better idea than to use a level which looks reasonable to the appraiser or to the agency for which he is working. The appraisal report should state definitely what prices were used. If they are an average over a period of years, the years used should be indicated. Looked at in this way, the question of prices concerns the description of the farm. It concerns the appraiser's opinion of value only indirectly.

Should the appraiser attempt to report land values in any way other than present sale prices? In January 1941, Mr. H. G. Harrison, Supervisor of the Farm Mortgage Department of the Prudential Insurance Company, spoke to my class in Farm Appraisal. He made the following statement: "Probably about all an appraiser may safely undertake is a determination of present value. The desire to look ahead is felt by all of us from time to time but it would seem to be wise to recognize our limitations.—In our business of lending, our conscience is clear if our loans are secured in the orthodox way on the date the loan is made."

In 1941, I was of the opinion that the "normal" value idea was worth something. I was not ready to go along with Mr. Harrison. In reviewing the notes in my appraisal class, I note that our report forms required the students to indicate the normal value of the farm through 1948. In 1949, we started using only present market value. I had come to the conclusion that Harrison and Norton were right. Appraisals are made primarily as aids in land purchase and sale or in lending operations. In both of these, business can be done only at the present market value.

Last week I was discussing these questions with a representative of one of the insurance companies lending on farm mortgages. He was wondering whether it might not be desirable to make appraisals on the basis of present value. I believe that more of us will begin to think of the same thing.

It would be my recommendation that lending agencies request their appraisers to report present market values of farms. The appraisers will then know what they are reporting. If the agency feels uncertain with respect to the future they may lower the percent of present value which they are willing to lend. This, in fact, is all that they can do, regardless of the figures on the appraisal report.

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[3] L. J. Norton, "Some Fallacies of Normal Value in Farm Land Appraisals," paper read at Farm Appraisal Conference, University of Illinois, June 16, 1948.

During the last 20 years much progress has been made in the field of farm appraisal. Many of these points have been discussed in Dr. Murray's paper. They come under the heading of a more complete and accurate description of the property in terms of both physical items and productive capacity. Since we have not yet learned how to predict the price level for the next six months–let alone the next 20 or 30 years–we will do well to limit our appraisals to present market values of farms, the only thing we really know. If an appraiser gives the correct present market value, together with a definite statement telling why the farm has that value, he has done his job.

TRENDS IN FARM SIZE AND ORGANIZATION AND THEIR IMPLICATIONS

Chairman: H. L. Patterson, Department of Agriculture, Ontario

TRENDS IN FARM SIZE AND ORGANIZATION IN THE UNITED STATES

JAMES VERMEER
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THIS paper is concerned with the trends in size and organization of the 16 types of farms which the Bureau in cooperation with the Land-Grant Colleges has been studying since 1938. Many Land-Grant Colleges and Universities and several private institutions for years have studied costs and returns to farms by types and size, hence the work on this subject by the Bureau of Agricultural Economics is not new. However, the BAE studies have some distinguishing features.

These studies provide both an historic picture and a current account of changes in size, investment, income and expenses, operating ratios, and other characteristics of commercial family-operated farms of given types in specified locations. To date the studies have been limited, for the most part, to the prevailing type of farm in each of several important type-of-farming areas. An average farm is one that is operated largely by a farmer and his family, and that provides their major source of income and employment. The organization of these commercial family-operated farms is determined by the average size, average acreage in important crops, average numbers and classes of livestock, and average investment of farms of the same type in a given area. In arriving at these averages, small-scale farms, part-time farms, rural residences, and large-scale farms are excluded from the basic data.

Each of these types of farms, although perhaps the chief type in an area, does not necessarily represent an average of the area. Frequently, the area has a sufficient number of other types so that an average farm organized on the basis of averages for the area would be materially different. It differs from a farm concept which might be obtained from a case study or a study of a few cases in that it does not trace changes which take place when farms change from one type to another. For example, farms that in 1930 were cash grain farms, by 1940 may have shifted to livestock production; so they would not be included in the 1940 estimates for cash-grain farms.

Also, by definition, the range in size of farms included in the basic data is limited. The limits are quite wide, but perhaps sufficiently restric-

tive to prevent the full change in size of farms from being reflected in the data.

This is one of the first integrated studies of costs and returns of major types of family-operated farms in several important farming areas in the United States. Other studies have been made which show similar information for one or more types of farms in a state or region, but most of these are "one-time" studies. In a number of states, data showing costs and returns are available from farm records. But the farms represented usually are above average in resources and management, and it is difficult, if not impossible, to adjust these data to average or typical conditions. Procedures and definitions in the BAE series are uniform so that production, income, costs, investment, etc., are comparable among the several types of farms. Likewise, data from year to year are comparable, thus providing a usable measure of trends. This does not mean that no new methods have been adopted in the decade in which these studies have been in progress. Procedures are constantly revised to give more direct and more meaningful answers to questions which arise. Each change in method is applied to the entire series of data. General objectives and procedures, however, have remained unchanged.

These analyses of average family-operated farms do not supplant other types of farm-management research; rather, they fill a gap between aggregates of farm incomes, expenses, production, etc., and the case studies of typical farms. They provide an insight into the effect that natural, economic, and sociological forces have had upon average farms of different types. Their greatest usefulness has been to provide a basis from which to project the net results on average farm incomes of prospective changes in prices received by farmers, cost rates, acreage allotments, and technological progress.

Case studies of typical farms, adjusted to average conditions, reflect more adequately the kind of changes that take place on an individual farm. They also reflect fully the changes in size and type of farms, and are more easily adapted to farm budgets.

With that brief background of the history and methodology of this project, it will be easier to interpret the significance of trends in size and organization of commercial family-operated farms in various parts of the United States, as shown by an analysis of these 16 types of farms.

Changes in Size of Farms

Size and changes in size of commercial farms affect changes in the level of production, changes in efficiency of operation, and, to a lesser extent, changes in the incomes of farmers. The BAE studies have been limited to a relatively few types of farms in comparatively narrow size ranges. So perhaps we should look first at changes in size of all farms.

According to the Census of Agriculture, all farms in the United States averaged 157 acres in 1930 compared with 195 acres in 1945. This is an increase of about 24 percent in 15 years. In 1930, however, about one sixth of the farms were classified as part-time farms and rural residences. By 1945, one fourth of the farms were in these two classes. Also, cropper units are included as census farms, and, contrary to the trend in part-time farms and rural residences, the number of croppers declined from 1930 to 1945.

In the 1945 Census of Agriculture, farms in the South were enumerated as management units as well as census farms. Bachman has estimated the number of management units in 1930.[1] Assuming that the average size of part-time farms, rural residences, and small-scale units was the same in 1930 as in 1945, we have estimated that in 1930 the combined average size of commercial family and large-scale farms (management units) was 244 acres. By 1945, the average was 315 acres. This is an increase of 29 percent in the 15-year period.[2] Most of the 16 types of commercial family-operated farms we have observed have not grown as rapidly as the average of all commercial farms. The acreage in cattle ranches of the Intermountain Region, however, was more than a third larger in 1945 than in 1930. Preliminary work on other types of cattle and sheep ranches indicates that acreages in other types of ranches also increased by a third or more during this period.

Measures of Size

Several different measures of size are available. When applied to the different types of farms, each of these gives different arrays of magnitude. When judged by all land in farm, number of animal units, or total investment, cattle ranches of the Intermountain Region appear to be the largest of the 16 types studied. If acres of cropland are used as a measure, the wheat grain sorghum farms of the Southern Plains are largest. Other measures of size would give still different arrays of these 16 types of farms. In 1950, hog-beef fattening farms and cash-grain farms in the Corn Belt had the largest gross incomes; dairy farms used the greatest amount of labor; total inputs, which reduce land, labor, and capital employed in the farm business to a common denominator, were highest in 1950 on cattle ranches of the Intermountain Region and on cash-grain farms in the Corn Belt, and lowest on two-mule family-operated cotton farms in the Delta of Mississippi.

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[1] K. L. Bachman, *Chapters on Farm Size with Special Emphasis on Low-Production Farming Units*, March 1951. (Dissertation).

[2] Recent censuses have obtained more complete coverage and include more range land as "land in farms" thus accounting for part of the increase in size.

In any one year, some measure of production probably would give a similar comparison of size between farms as is shown by a comparison of gross farm income. But in gauging changes over a period of years in size of a given farm, a measure of production has the advantage of removing effects of changes in price from gross income. For some types of farms, production is a satisfactory gauge of change in size, but for others the hazards of weather, disease, and insects would affect production, and consequently the size of farm, as much as any other factor.

Change in Size of Crop Farms

Perhaps the most common measure of size is total acres in farm. However, this measure is appropriate only in measuring changes in size of crop farms. Even here, acres of cropland would be a better measure, but for a given type of farm changes in cropland usually vary with changes in total acres.

Of the 16 types of farms studied, nine are primarily crop farms. All of these farms increased in size from 1930 to 1950. The extent of the increase varied by type of farm. Spring wheat-corn-livestock farms in the transition area between the Corn Belt and the spring-wheat areas were only 10 percent larger in 1950 than in 1930, whereas cotton-grain-sorghum farms on the High Plains of Texas increased 25 percent during the same period. It may be noted that the average wheat farm in the transition area, which experienced the smallest increase in size, is also about the least specialized crop farm in this group, and the cotton farm on the High Plains is about the most specialized crop farm. The degree of specialization is measured by the proportion of receipts from crops in 1950. The increase in total acres generally was more pronounced on crop farms than on other types of farms.

Change in Size of Livestock Farms

Other measures may more readily indicate changes in size of other types of farms. On highly specialized dairy farms a measure of production is relatively easy to compute, and for most purposes it is a satisfactory measure of size or of change in size. Dairy farms in central New York had an average of 17 cows in 1930 and 21 in 1950. In addition, milk production per cow rose from 5,700 pounds annually to nearly 7,000 pounds during the same period. This represents a 52-percent increase in production of milk over the 21-year period. As more feed was bought in recent years than in the 1930's, the increase in net farm production was not as great as the increase in production of milk.[3] But with higher

[3] Net farm production is the quantity of farm products sold, consumed, or available for sale or consumption in the farm household during the calendar year.

crop yields, more cows, and higher output per cow, net farm production increased about 45 percent from 1930 to 1950.

Judging from the increase in net farm production, dairy farms in southern Wisconsin grew even faster than dairy farms in central New York. Net farm production on these Wisconsin farms was nearly 50 percent higher in 1950 than in the early 1930's. However, these dairy farms are less specialized than those in New York. Production of crops—corn, small grains and hay—and hogs also are important enterprises. In the early 1930's, crop production was low because of unfavorable weather. Obviously, in this case change in production is not a good measure of change in size.

A second measure of size, and in this case a better one, is total inputs. To obtain a composite of all inputs, all items used in production on these farms were valued at constant prices. On this basis, the average dairy farm in southern Wisconsin was 21 percent larger in 1950 than it was in the early 1930's.

The three types of Corn Belt farms other than cash-grain are diversified farms, for which no single measure of size is wholly adequate. Production of corn, oats, hay, and hogs are important enterprises on all of them. In addition, hog-dairy farms have a considerable dairy enterprise, hog-beef raising farms raise beef cattle and hog-beef fattening farms both raise and fatten beef cattle. With such a diversity of enterprises perhaps the one best measure of size here, as on Wisconsin dairy farms, is total volume of inputs. On this basis, these Corn Belt farms were 11 to 16 percent larger in 1950 than they were in the early 1930's. Hog-beef fattening farms experienced the smaller increase in size while the hog-dairy farms made the largest proportionate increase.

Tobacco-livestock farms in the Bluegrass Region of Kentucky are a combination of intensive and extensive land use. Only about four to six acres are used for tobacco. This acreage has remained about the same for the last two decades, although yields have nearly doubled. Most of the remaining acreage is used for pasture and hay. As measured by total inputs, these farms were about 16 percent larger in 1950 than they were 15 to 20 years earlier.

Cattle ranches of the Intermountain Region are highly specialized, with about 95 percent of the receipts coming from the sale of cattle and calves. These ranches have maintained about the same size of herd over the last 20 years. Cattle numbers were down slightly during the drought years of the middle 1930's, and the composition of the herd shifted among breeding stock, steers, and calves. But the total number of beef cattle on these ranches has remained at about 200 head.

Up to this point we have discussed changes in size of farms in terms

of four different units—total acres, net farm production, total inputs, and numbers of livestock. No one of these is a good measure of change in size of all farms. The following table shows the changes in total inputs

TABLE I. TOTAL INPUTS, COMMERCIAL FAMILY-OPERATED FARMS BY LOCATION AND TYPE

Type of farm	Total inputs, (1930–34=100)				Total inputs, 1950	
	1935–39	1940–44	1945–49	1950	1935–39 dollars	cash grain farms=100
Corn Belt farms						
Cash grain	101	109	116	116	4,524	100
Hog-beef fattening	104	107	111	112	4,174	92
Hog-beef raising	98	110	118	119	2,468	55
Hog-dairy	102	115	118	119	3,069	68
Dairy farms						
Central New York	93	114	128	129	3,938	87
Southern Wisconsin	103	114	121	121	3,238	72
Winter wheat farms (S. Plains)						
Wheat	89	103	112	115	3,565	79
Wheat-grain sorghum	92	110	118	122	4,077	90
Spring wheat farms (N. Plains)						
Wheat-corn-livestock	92	110	113	114	2,928	65
Wheat-small grain-livestock	93	111	111	111	2,816	62
Wheat-roughage-livestock	84	103	112	115	2,612	58
Cattle ranches						
Intermountain Region	94	108	114	132	4,622	102
Cotton farms						
Southern Plains	101	112	111	107	2,455	54
Black Prairie, Texas	99	106	114	109	2,106	47
Delta area, Mississippi	113	112	116	110	1,140	25
Tobacco-livestock farms						
Kentucky Bluegrass area	101	111	117	115	2,145	47

of all types of farms in the series. Trends in total inputs are not always the same as those discussed earlier.

Changes in Farm Organization: Mechanization

Some of the changes in farm organization that came about rapidly in the 1940's were under way already in 1930, and even earlier. Farmers were buying tractors and selling their horses and mules. At least, they were not replacing those that died. By 1930, more than 50 percent of the cash-grain farms in the Corn Belt, spring wheat farms in the Northern Plains, and winter wheat farms in the Southern Plains had tractors. In fact, by that time nearly all the winter wheat farms had tractors. The proportion of spring wheat and cash-grain farms operated with tractors increased rapidly, and by 1943 nearly all of them had tractors, too.

Dairy farms in both central New York and southern Wisconsin, livestock farms of the Corn Belt, and cotton farms of the Southern Plains and the Black Prairie areas of Texas did not shift to tractor power quite so

early. It was late in the 1930's before even half of these farms had tractors.

On the small cotton farms of the Mississippi Delta and the tobacco-livestock farms in Kentucky, the average number of horses and mules per farm has changed very little over the 21-year period. On many of these farms crop acreages are too small to justify the investment in a tractor. However, about a third of the larger tobacco-livestock farms had tractors by 1950.

Cattle ranches in the Intermountain Region are rapidly shifting to tractor power for their field work, which is primarly haying, but at the same time each has maintained a string of 13 to 18 horses. It is difficult to estimate how many horses are kept for ranch use and how many are kept for personal use, pleasure, and tradition.

Tractors probably replaced horsepower even more rapidly than the decrease in the number of horses and mules and the increase in the number of tractors would indicate. Many farmers kept horses and horse-drawn equipment after acquiring tractors in order to have a second source of power for use in busy seasons.

During the 1930's, farm machinery depreciated faster than it was replaced. On many farms the investment value of machinery was lower in 1940 than it had been 10 years earlier. Some farmers continued to use horse-drawn equipment with tractor power because it was cheap compared to new tractor equipment. For many jobs, equipment especially adapted for tractor use was not available.

Changes in quantity of machinery on farms during the 1930's are not subject to precise measurement. The kind of machinery farmers used was changing. Although in 1930 most farmers had a preponderance of horse-drawn equipment, by 1940 many had acquired a good deal of tractor equipment. In the meantime much of the horse-drawn equipment had worn out or become obsolete. Not only had the kind of equipment farmers used changed, but its quality had changed also. Most tractor equipment is stronger than horse-drawn equipment and is built to last longer. However, by comparing investment in machinery with prices of machinery it is clear that, considering the quantity and quality of equipment, most farmers had less machinery in 1940 than they had had 10 years earlier. Prices of farm machinery did not vary appreciably during this period, so that changes in its quantity followed about the same pattern as changes in investment.

Investment values of machinery increased rapidly from 1940 to 1950 on all types of farms. On Corn Belt farms, investment in machinery nearly tripled from the late 1930's to 1950. Winter wheat farmers of the Southern Plains had not replaced old equipment during the series of poor crops in the 1930's. By the end of the decade their machinery was

worth about $1,800 per farm. During the 10 years following 1940, and especially during the last five years, they bought a lot of new equipment. Average investment in machinery in 1950 was nearly three times as high as it was 10 or 12 years earlier. On most other types of farms the change in investment in machinery followed about the same trend.

Cotton farmers on the Southern Plains and in the Black Prairie Region of Texas extended their investment in machinery even during the 1930's, when investment in machinery on other types of farms was going down. By 1950, these farmers had an investment in machinery three to four times as large as it was in 1930, and two to three times as large as it was about 1940.

Again, if investment is adjusted for changes in prices, a clearer picture is obtained of the amount of machinery on farms. At the end of the 1940's, farmers had from 35 to 90 percent more machinery than they had had 10 years earlier. Corn Belt farms had from 55 to 80 percent more; dairy farms in central New York and southern Wisconsin had about 50 percent more; winter wheat farms about 70 percent more; spring wheat farms from 35 to 65 percent more. Cattle ranches of the Intermountain Region had about 45 percent more machinery, and cotton farms on the level lands of Texas had from 65 to 90 percent more.

Change in Investments

Change in total investment value from the late 1930's until the present time shows that current investment in most types of farms is now about two to three times higher than it was in 1937-41. However, in the 1937-41 period investments were only a half to two thirds of what they had been in 1930. Total investment dropped from 1930 until 1933 or 1934, and did not return to the earlier level until about 1943. On most types of farms this lower investment value was merely a reflection of a lower price level.

On spring wheat farms in the Northern Plains area, however, the size of the average farm decreased noticeably from 1930 to about 1935. In addition, the severe drought of 1934 forced farmers to sell a large part of their livestock. It was 1940 before size of farm and livestock numbers returned to the level of 1930. Total investment value on these spring wheat farms did not reach the 1930 level until about 1944 or 1945. By 1950, total investment value, which includes about a 14-percent larger acreage, nearly 50 percent more machinery, and more productive livestock was about $28,000, or about 50 percent larger than it was in 1930.

In 1950, investment in other types of farms varied from an average of nearly $70,000 in cattle ranches and cash-grain farms, to $9,000 in the average two-mule family-operated cotton farm in the Delta of Mississippi.

Change in Combination of Assets

Types of farms vary considerably as to combination of assets. On cattle ranches where more than half the grazing is provided by publicly owned land on a fee basis, cattle are the chief single item of investment. On January 1, 1950, investment in livestock averaged about $37,000 per ranch out of a total investment of about $70,000. On crop farms, land and buildings account for a large part of the assets. In 1950, total investment averaged about $69,000 on cash-grain farms in the Corn Belt. Investment in land and buildings was nearly $55,000. Frequently, crops on hand made up a large part of the investment on these farms. On dairy farms and livestock farms of the Corn Belt, most of the capital is invested in land and buildings with a substantial additional amount invested in livestock.

Changes in Distribution of Inputs

Any real changes in investments frequently are hidden by shifts in the relative price of different classes of assets. Variations in the prices of real estate and machinery usually lag from several months to a few years behind changes in the prices of crops and livestock. In the meantime, the proportion of capital invested in the various classes of assets may have changed considerably without any real difference in the organization of the farm.

Real changes in organization can be measured if these various assets, plus operator and family and hired labor, and other items purchased for use in the farm business, are converted to a common denominator. This can be done by applying a set of constant prices to all items used in production. Changes in the proportion of each input to the total will indicate the change in organization. These inputs vary a great deal less from year to year than investments, production, gross value of product, or other composite measures of organization.

The two main inputs on nearly all farms are operator and family labor and annual cash inputs in the form of tractor fuel, machinery repairs and replacement, feed, hired labor, fertilizer, etc. These are also the two factors that have shown the most easily recognizable trends over the last 20 years. On all types of farms studied, operator and family labor is becoming a smaller part of total inputs while cash inputs are becoming an increasingly larger part of the total. This does not necessarily mean that farmers are working any less, but rather that they are using more of the other factors of production.

As pointed out earlier, the average number of acres per farm was greater in 1950 than it was in the 1930's, and farmers used more machinery and fewer horses than they did in the earlier years, but the

proportion of inputs in the form of real estate and working capital remained about the same.

Farmers are buying an increasingly larger proportion of the items used in production.

TABLE II. CASH INPUTS AS A PERCENTAGE OF TOTAL INPUTS, SELECTED TYPES OF FARMS[a] 1930 to 1950

Location and type of farm	1930-34	1935-39	1940-44	1945-49	1950
Central New York dairy farms	54	52	57	60	64
Corn Belt hog-beef fattening farms	42	46	45	46	47
Southern Plains winter wheat farms	39	38	41	45	48
Black Prairie cotton farms	31	33	37	43	41
Intermountain cattle ranches	41	39	43	49	55

[a] Cash inputs are cash or cash equivalents, including building and machinery repairs, replacement, and depreciation.

As frequently happens with summary trends of this kind, these figures represent a net trend of a generally increasing proportion spent for operation and purchase of machinery, and a decreasing proportion for hired labor. On dairy, Corn Belt, and cotton farms of the Southern Plains and the Black Prairie of Texas, expenditures for purchases and operation of power and machinery were less than 10 percent of total inputs in the first five years of the 1930's. During the last five years of the 1940's, these expenditures averaged about 20 percent of total inputs. On wheat farms in the Great Plains, these expenditures were from 15 to 20 percent of total inputs in the early 1930's, compared with 30 to 35 percent in the late 1940's. Hired labor represented a decreasing proportion of inputs on most types of farms, but on dairy farms it accounted for about four to nine percent of total inputs, with almost no indication of an upward or downward trend during the period. On hog-dairy farms in the Corn Belt, hired labor represented a slightly larger proportion of total inputs in recent years. Purchased feed constituted from a fourth to a third of total inputs on New York dairy farms, with a tendency toward the larger proportion in recent years.

Production on all types of farms has increased and, on most of them, it has increased faster than inputs. But on cotton farms of the Black Prairie, inputs have about kept pace with production, and on cattle ranches of the Intermountain Region, inputs have risen faster than production. Ranch acreages are larger, more power and machinery are used, slightly more labor is hired, although total labor used has gone down, and other operating expenditures have risen. Total cash inputs on cattle ranches were about 75 percent higher in 1950 than in the early 1930's, whereas all inputs were a third higher.

Change in Farmers' Financial Position

An analysis of changes in size and organization of farms cannot be separated entirely from changes in prices. Farmers produce different kinds and amounts of goods and use various kinds and amounts of materials and labor, depending upon the relative prices of these items and the margin between income and costs of various enterprises. It is our purpose to examine briefly the effects that these changes have had on the financial position of farmers.

One measure of financial strength is the ratio of operating expense, including depreciation, to gross farm income. In each of the five postwar years, this ratio was lower than the average of the five prewar years, 1937-41, for nearly all types of farms. This means that in recent years farmers have retained more out of each dollar of gross income for family living, saving, or reinvestment in the farm business. Generally, these favorable ratios are attributable to higher yields, higher production, and higher prices. However, higher yields, production, and prices do not necessarily mean larger margins on all types of farms. In 1949, the large cotton crop made it necessary to hire more than the usual amount of additional help for picking. With a relatively high price for cotton and a strong demand for labor, wage rates went up, and total operating expense took a larger part of the gross farm income than in any other postwar year or the average of the five prewar years, 1937-41.

A second measure of the financial position of farmers is the ratio of net farm income to investment. During 1937-41, the average net farm income was from a twelfth to a third of total investment. On most types of farms it was about one seventh. Because of the relatively low levels of net farm income during the latter part of the 1930's, nearly all of the income was used for family living. This left very little for saving or investment in the farm business. By 1950, this ratio had become more favorable, and on most farms net farm income was a fifth of total investment. With the much higher level of income, this left a great deal more of the net income available for savings and investment.

These wider margins do not indicate the same degree of security to a farmer who has recently borrowed large sums to buy and operate a farm that they do to established farmers. Interest payments, as well as family living and payments on principal, must come out of net income. But even including interest on current investment at existing rates of interest, the net return to the operator in terms of prewar prices is still above prewar levels on most types of farms. However, if a farmer is to buy and pay for a farm out of income, a continued high level of income for several years is essential.

Summary

In presenting the changes that have taken place on 16 types of farms over a period of 20 years, some detail is unavoidable. At the risk of oversimplification, I shall try to summarize those changes. Currently, typical farms are up to 40 percent larger than they were 20 years ago. They average about 20 to 25 percent larger. The quantity of machinery on all farms in the United States doubled from 1941 to 1950, but the commercial family-operated farms in the BAE series have acquired additional machinery at a less rapid rate. They now have from 35 to 90 percent more than in the late 1930's. Changes in production from the late 1930's to 1950 vary from practically no increase on Black Prairie cotton farms and on cattle ranches to more than double on winter wheat farms. Production on most types of farms was 25 to 70 percent higher in 1950 than in 1937-41. Total investment increased two to three times during the same period, although it should not be forgotten that the low prices in the late 1930's pulled investment values down to the lowest level in many years.

The amount of family labor used in farm production has remained relatively unchanged, and the amount of labor hired has gone down. Farmers are using more of other factors of production, land, and working assets. Cash inputs—tractor fuel, machinery repairs, building repairs, fertilizer, seeds, etc., are becoming a larger part of total inputs.

Farm operating expenses have risen, but incomes have risen even more. Ratios of income to investment were more favorable in the late 1940's than they have been at any other time in the last 20 years.

IMPLICATIONS OF TRENDS IN FARM SIZE AND ORGANIZATION

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IT IS our intention here to comment on the significance of some of the general adjustments now under way in the organization of farms in the United States. Our remarks are not intended to be an adequate summary or review of the detailed facts about changing farm size. We note only certain components of the situation and focus attention on the meanings we derive from them.

I

The broad outlines of changes in farm size and farm organization are fairly clear and well known. The United States has increased farm production some 40 percent since before World War II. Available statistics indicate that this increased output has been due not only to innovation and improved manipulation of production factors; there also has been a significant increase in total productive inputs associated in the farming industry.[1] Furthermore, it is estimated that the number of farms in the United States decreased 12 percent between 1940 and 1950.[2] This has been in keeping with a similar trend in preceding decades.[3] These facts vividly imply that one of the impressive phenomena of recent years has been a considerable increase in the scale of operations of farms as business units.[4]

This is itself significant. At the same time it is true that many of the important social and economic implications of recent trends arise more directly from changing relative intensities of factor utilization, associated with, but not necessarily reflected in, changing scale of operations as such. We shall just note the general directions of such changes, but before doing so we would add and stress the fact that it is not merely the flow

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[1] By 1948 total productive inputs in agriculture had increased 22 percent over the base period 1935-1939. USDA, Statistical Bulletin No. 83, *Farm Production Practices, Costs and Returns*, p. 74.

[2] We are indebted to Dr. Margaret Hagood for this and other estimates from a forthcoming Wisconsin bulletin: *Rural-Urban Migration in Wisconsin, 1940-1950.*

[3] See Sherman E. Johnson, *Changes in American Farming*, Misc. Pub. 707, USDA.

[4] Increasing scale of operations involving a summation of all productive inputs is accepted as the ultimate meaning of size of farm, in agreement with most writers who have subjected the term to careful definition; e.g., J. D. Black in *Production Economics*, Holt, 1926, G. W. Forster in *Farm Organization and Management*, Prentice-Hall, 1946.

of particular factors that is important. Their changing form also demands very careful analysis.

Increasing farm output in the United States has paralleled a fairly constant crop acreage and a decrease in total manpower. Although national figures show an increase in the area of land in farms, the reverse tendency is true in most farming regions outside the grazing areas. In fact, on the basis of crop acreage figures and the claims of losses in fertility through erosion and extractive farming, there is reason to assume that in recent decades total land resources in farms may well have shown a net decline. There is no doubt about a decline in farm labor. Rural farm population decreased by approximately 15 percent between 1940 and 1950 in terms of 1940 definitions.[5] Indexes of total farm employment have been falling for several decades and particularly during the last 10 years.

However, as already mentioned, total resources employed in agricultural production have been increasing. In aggregate terms, inputs of capital have more than offset reduced labor inputs and possibly decreasing farm land resources. The overwhelming fact in recent trends in farm size is the increased application of capital resources.[6] Accordingly, we need more information than we yet have on changing forms and conditional rates of application of farm capital, for adequate appraisal of the changes taking place in the organization of farms.

Changes in area size of farms do not adequately reflect variations in the scale of their operations and organization. There is a real need for more detailed combined analyses, in locational context, of adjustments in capital and labor along with land. However, with a decreasing number of farms and a changing allocation of land to individual units, it is obvious that land, as well as capital, is playing an important part in current changes in the scale of operations of farm businesses.

The outstanding general fact revealed in recent trends in farm area size statistics is the concentration of farm lands in larger spatial units. In Wisconsin, to take one state as an example, the average size of farms is increasing at an impressive rate. The total number of farms declined about 15 percent from 1940 to 1950, with a slight increase in total land in farms. There were increases in the number of farms under 10 acres in eight counties with industrial cities, and in a few counties in the recreational areas. But the characteristic change in Wisconsin has been a decline in the number of farms under 100 acres, and appreciable in-

[5] Dr. Margaret Hagood, op. cit.

[6] For example, the index of total farm power and machinery (base 1935-39–100) was recorded as 163 in 1949. Equivalent indexes for animal units of breeding livestock and fertilizer utilization stood at 119 and 276 respectively in 1949. *Agricultural Outlook Charts*, USDA, 1951, pp. 4, 5, 10.

creases in the number of farms over 140 or 180 acres. The acreage of land in Wisconsin farms under 100 acres declined by about 25 percent from 1940 to 1950; there was an increase of about the same proportion in acreages in farms over 180 acres.

Sample county comparisons in a few other states indicate comparable adjustments for their types of farming. Furthermore, this phenomenon is not limited to the United States. For instance, the same general tendency is evident in Australia,[7] in spite of its far more active policy of favoring the family farm unit,[8] or as the Australians aptly call it, the "home maintenance area."[9] Even in England and Wales, a decided tendency toward amalgamation of small holdings has replaced a previous trend toward partition and dismemberment. Since 1933, only holdings of over 300 acres have been increasing in numbers in England and Wales.[10]

In all three countries there is, in terms of area size, this tendency toward an increasing importance of large family farms and of larger than family farms. Which is of most significance we believe to be still an open question. We do not feel that the evidence is sufficiently conclusive to give unqualified support to Sherman Johnson's generalization that: "More noteworthy than the growth in large-scale farming (is) the shift to larger family farms within all size groups of 100 acres and over.[11]

There is no doubt that, while the small family farm is declining in importance, the family farm as such still remains by far the most important operational unit throughout American agriculture.[12] It still tends to form the modal group. One also gets the impression, although we know of no up-to-date studies dealing directly with this point, that the predominant process by which the noted adjustments are being made, is the gradual assimilation of tracts of land by established going concerns. Farmers who were well equipped in 1940, and especially those with sons who were interested in farming, have reaped the harvest of advantage that accrues to real going concerns in times of prosperity. The fact that recent adjustments undoubtedly have been in the direction of using labor on family farms more effectively supports this contention. In Wisconsin, as is evidently the case generally, our farmers are getting

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[7] See statistical appendix to article on "Farm Size" by F. H. Gruen, *Review of Marketing and Agricultural Economics*, N.S.W. Dept. of Agriculture, March 1949.

[8] This policy includes a progressive land tax; compulsory resumption and resettlement of extra large holdings; and limitations on the purchase of land by existing land holders.

[9] Defined as sufficient land to support an average family in average circumstances in an average season.

[10] D. K. Britton, *Are Holdings Becoming Larger or Smaller?* Agricultural Economics Research Institute, Oxford, 1950.

[11] Sherman E. Johnson, op. cit., p. 53.

[12] See Special Report, *1945 Sample Census of Agriculture*, Table 29.

along with less and less hired labor; for example, it has been estimated that there was a 25 percent decrease from 1944 to 1949.[13]

Hence, it is not to be denied that there has been a shift of land to larger family farms, nor that this shift has been in keeping with more efficient resource utilization. Nevertheless, it is also true that, with minor exceptions throughout the country, the most important relative increases in number of farms have occurred in those area size brackets that obviously exceed the locational demands of the efficient family farm. Admittedly these size groups still constitute only a small fraction of total farming units. However, in terms of area of land they are far more important, and the rapid rate of increase in their numbers should not be passed over lightly.

Before proceeding further, we would emphasize that trends in the size and organization of farms are only of a marginal character. Indeed, uniformity through time is really the most noticeable characteristic of the structure of agriculture. This warns us against reading too much into discernible changes in detailed aspects. We hope not to lay ourselves open to this charge in the remarks that follow.

II

The economic climate has been particularly conducive to changes in farm organization in the last decade. The prosperity of the war and postwar years has brought some significant characteristics into bold relief. In anticipation of the consideration of some specific issues which appear especially significant, we should perhaps note a few of the general adjustments in process which give meaning to the more particular happenings.

During and since World War II, the increase in wages of hired workers has been without parallel in our history. The rise for industrial workers from 1935-39 to March 1951 was 324 percent. Wages of farm workers have increased 296 percent during this same time.[14] As a parallel trend there have been impressive adjustments in the economy of labor utilization on farms, particularly in crop production. One aspect has been the decrease in the number of regular hired men on farms, which in itself has made farming more dependent upon the family as a source of labor. Correlatively we can expect seasonal and migratory labor to be acquiring at least a more strategic role.

Second, the price stabilization program of recent years, together with the expectation that future farm prices will be stabilized within the

[13] Dr. Margaret Hagood, op. cit., p. 46.

[14] Computed from *The Agricultural Situation*, June 1951; the farm wage index is for April 1951.

limits of tolerable price floors, has undoubtedly contributed to the increase in scale of operations of farms. The general principle appears to be that as price risks are reduced, comparative advantage shifts toward both technological efficiency and investment.

Third, there seems to be something like a glacial drift of greater differentiation of economic function within our farm economy. This has the consequence of accentuating the problems of combining in one farm family the investment, labor, and management functions. Stated conversely, some of these developments are giving investment-minded people something of a field day in American agriculture.

Finally, the increase in size of farms and decrease in labor utilization are only the converse side of the reduction in the proportions of persons living on farms. This poses a number of policy issues which may be of the greatest moment for agricultural institutions and policy.

III

While regular hired labor has decreased, it would appear that reliance upon seasonal and migratory labor in the specialty crops has continued to increase. Also custom work in general farming operations, in many areas, remains important. In terms of changes in farm organization, one of the more interesting developments is the tendency for managerial responsibility in the production and harvest of canning crops to be assumed by the factory, which is able to employ gang labor. Thus, the thinning, hoeing, and harvesting of tomatoes and the harvesting of peas and corn may now often be classed as a factory job. In such circumstances the farmer does little more than work the land and provide the space for the crops.

We are all familiar with the vast problems which are associated with seasonal and migratory labor—problems of wage standards, housing, education, and social security. These problems are demanding greater attention. We still have necessarily seasonal types of agriculture where job opportunities cannot compete for resident workers on a full-time basis. Also we are farming in the United States in a high-wage economy bordered on the South by overpopulated, low-wage economies. In terms of employment, we have in agriculture all kinds of conditions which are characteristic of unorganized seasonal, competitive industries. We have enlightened employers who are finding that good housing and living accommodations pay off in an improved working force. But we also have exploitation and abuses of many kinds. One of the complexities of this problem is that the size of the labor force, and consequently the level of wages, is a direct function of the immigration policy for admitting foreign seasonal workers. The President's Commission on Migratory Labor has

made a thorough and bold report on the subject. This problem, as no other, forces us today to follow in the footsteps of industry, by giving closer consideration to questions of labor standards, working conditions, and social security in agriculture.

IV

It may be useful in this discussion to remind ourselves of the extremely difficult task which American farm families undertake in their aspirations to own and operate efficient farms in this age of science and technology. In almost all old countries there has developed a two-class system of farming: the few wealthy and large-scale farm owners and operators, and the many with small farms, small scale of operation, or without any significant hold on the land. Many thoughtful people are uneasy about the future of American farms on this very score: is America drifting toward a two-class agriculture—even in the Middle West, the traditional stronghold of family scale operations?

This issue leads us into the question of the ownership of farmland; such statistics as we have do not indicate very striking changes in the above direction.[15] In fact, the recorded fall in the proportion of tenant operators of farms over very recent years has been of such a magnitude in many areas as to blanket significant trends we feel still to be going on. In actual fact, our information on this point of ownership of farmland is most inadequate. This reflects in part, no doubt, the intense preoccupation of economists with the mechanical analysis of operating efficiency. But there are other contributing factors, including the difficulty of getting accurate information on what is felt to be intimate or personal matters. Nevertheless, we urgently need much more information on possible changes in the pattern of farm ownership if we are to be intelligently informed about what is actually happening to farms in the United States. Not the least of the reasons for this need is to be found in the fact that the really devastating consequences of inflation are upon the capital structure of an economy.

One picks up remarks all over the Middle West these days about possible significant happenings in this connection; city money seeking a haven from inflation through buying farms; corporations buying farms in real numbers—as the Curtis Candy Company in Indiana; persons buying farms purely as good investment.

So far as we are aware no one has ever made a study of the influence of the high federal income taxes upon the purchase of farm land. It seems clear, however, that allowable practices of deducting farm operating loss

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[15] For the Midwest see: Barlowe and Timmons, *Farm Ownership in the Midwest*, Iowa A.E.S. Res. Bul. 361, June 1949.

from taxable income has given persons of high income, mostly city people, a different cost-returns relationship from that most farm people enjoy. For several years, complaints have been made by local farm boys about the utter impossibility of competing with city money in an open market in buying farms within easy driving distance of Chicago. This issue could be investigated.

But there is a still deeper aspect to this question. Where else, other than real estate, can savings be invested? Not many years ago, one heard comment after comment that bankers were advising people concerned with safety and earnings in investment to buy either real estate or government bonds. The inflation since World War II seems to have shaken people's confidence in the wisdom of bond buying. If so, this promises to put still more pressure on the real estate market. One of the very great items here influencing the alternatives of investors is the separation of ownership and control in stocks of corporations. In practice this separation has the effect not only of depriving the owners of stock of effective control over the industry; it also makes the ownership of stocks quite speculative.[16] This, in turn, promises to divert more funds into the purchase of farm lands.

Lest these remarks be misunderstood, two qualifying comments may be in order. First, we are not viewing with alarm; we are suggesting facets of the problem that seem to warrant notice and investigation. Second, as regards "investment" in farms we need to make a clear distinction between investment which merely transfers property from one person to another, and investment in the general sense of adding to the stock of capital in an economy. However, it is true that a very substantial part of money invested by individuals in improved farms is a mere transfer of equities.

V

The emergence of the profession of farm managers and appraisers now makes it practical to view farmland as a pure investment. This development may turn out to be extremely significant in the ownership and operation of farms.

The President of the American Society of Farm Managers and Rural Appraisers, surveying the opportunities which lay before the profession, observed recently:

"Interest rates are lower and the investing public will gradually find that they can: (a) choose a farm with confidence, based on a sound appraisal, even though they know nothing of farming, and may not even

[16] No attempt is made here, of course, to do more than merely allude to these practices as a significant aspect of the alternatives of investors. For an analysis see Berle and Means, *The Modern Corporation and Private Property*, Macmillan, 1932.

see the farm. (b) Have the farm acquired and managed through a competent service with the same degree of freedom from making management decisions as if they had bought oil or steel stock.

"I think," he continued, "the investing public will gradually become even more interested in land as a pure investment."[17]

The President of the society, Mr. Elliot, seems to us to have stated admirably the essence of this development. Our only qualification of his comment would be that there is a difference between buying corporation stock and farmland as pure investment. With farmland, the investor also still buys the right to manage and control; whereas in the typical big corporation today, he does not; that is, in the kind of corporation whose stocks are freely purchasable on the exchanges.

Just how to appraise this possibility of the development of a pure investment in land is, of course, something else. So far as we are aware, there is no clear evidence that any way has yet been found to operate the general farms of America that is more efficient than the usual type of family farming. Consequently, the services of professional managers, used even more intensely than in the past, may simply strengthen the competitive position of farm families as farm operators. Perhaps the issue can be put more clearly by turning the statement a little; if the survival of the family type farm is to be seriously challenged, it is not likely to be on the open field of operating efficiency.

However, the possible consequences of practical procedures for separating out pure investment as a sheer economic function may still be great. Obviously this question includes a lot more than the functioning of professional farm managers. What is really involved here is the differentiation of the property function in farm organization. If one were to pursue the analysis of this differentiation, he would likely find that as a society becomes more complex the property function has something of an independent career of its own.

It may be quite suggestive of the possible relevance of this distinction to note that in western Europe, in France and Britain, for example, the regulation of landlord-tenant relations has reduced the owners' rights of control of their property toward the limit of making the ownership of farms equivalent to that of pure investment in land. Control and investment are being separated, but the controls are becoming public controls. Such practices have, of course, gradually evolved from situations where the function of the landlord was frequently only that of a collector of rent from the land.

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[17] F. E. Elliot, "Place of Professional Farm Management and Rural Appraisers in American Agriculture," *Journal of American Society of Farm Managers and Appraisers*, Vol. XIII, No. 1, April 1949, p. 9.

VI

The concept of pure investment in land and the various ways in which it has been made operative may be quite significant in the analysis of the capital problem confronting American agriculture. No doubt all of us have been given pause many times lately, by the cost of acquiring an efficient farm; 40- or 50-thousand-dollar farm businesses are not at all uncommon and many families are currently operating farms worth two or three times as much.

The accumulation of funds by farmers since 1940, the liquidity of agriculture, and the relatively low rates of debt incurrence are all impressive phenomena of these times. We have the impression, however, that much of the lushness of farm finance today reflects the advantages that accrue in prosperous times to farms already in operation as going concerns, with a reasonably adequate plant. For those who would start farming now, there may be an even greater advantage than usual to the young farmer who can get a start under the parental wing. If not here, then it would appear the start must in most cases be made from nonfarm employment. This is only an expression of opinion. There is need of more adequate information on this point. However, the general conditions of the case are quite clear; the real capital requirement for efficient farming is becoming greater. For that very significant proportion of future farmers who cannot be financed from family fortunes—probably more than half—reliance must be placed upon the capital market and credit and investment institutions.

Our cue here may be to differentiate in the loan rate a charge for management guidance—to reduce the operating risks—from a charge for more nearly pure interest. This would be something like putting the old Farm Security practice of supervised loans on a charge basis. Such an approach would require a careful appraisal of the productivity of capital and management, and a recognition of income earnings as security for a loan, rather than the "junk" value of the collateral. Only recently we ran across a case where a retired farmer loaned a young man, unrelated to him, with no assets other than his skill and integrity, $15,000 to get him started as a tenant farmer upon a 180-acre farm owned by a third party. The lender is charging seven percent interest and is visiting the farm and working with this young man, as many owners do in working with their tenants.

This issue of meeting capital requirements is made more difficult now by the fact that so many of our lending institutions are operating upon the assumption that we are now in a period of inflation to be followed shortly by a collapse of prices. Obviously, if they are right, both the institutions and the would-be borrowers who cannot qualify for loans will

be protected from great loss. However, the risks of such a course are not to be passed over lightly. For a conservative farm loan policy also means that a high proportion of farms over a period of years will be bought by members of well-to-do farm families or by outside investors. Should relatively high prices continue for 10 or 20 years, as many are predicting, a literal following of the "normal value" concept of appraisal could contribute appreciably to the failure of a full generation of financially disadvantaged farm boys to become farm owners.[18]

VII

It may be worth-while to give consideration to one or two general implications of the growing commercialization of agriculture—meaning by this a greater dependence upon market purchases of production ingredients, as well as production for sale. In broad outline, this adjustment is only one among many which more and more are blending city and country within the United States.

Beneath this closer integration of farms into the whole political and social fabric of the United States, there is running a current in the direction of developing a new concept of responsibility toward the public. The more enlightened representatives of interest groups are clearly leading the way on this point. The support of the foreign economic aid programs of our Government by the leaders of major farm organizations, despite real opposition from some of their own commodity groups, is an illustration. So is the recognition by labor leaders of the broader implications of wage issues—beyond mere job security—and by business leaders of the necessity for a distribution of the gains of industrial efficiency through a low margin of profit per unit on a large volume of output. These provide a basis for the recognition that the development of a broader public interest can be achieved through a reasonable conciliation of private interests.

In the case of farmers, this might be dismissed as a recognition of the inevitable, since farm population has dropped by about one sixth since 1920, while nonfarm population has increased by about two thirds. The rural farm population is now only a little more than one sixth of the total —and there is every reason to expect this trend of declining proportion to continue. In 1940 almost half the states (23) had less than 25 percent of their population on farms.

But agricultural fundamentalism dies hard. It seems to us that agricultural administrators and leaders still should take seriously the point made recently by Professor Charles Hardin that the political tactics being followed by the agricultural interests in America are running against the

[18] For a discussion of this problem in Texas, see Joe R. Motheral, *Progress of Land Tenure Adjustments in a Family Farm Area of Texas*, Ph.D. Thesis, Wisconsin, 1951.

main currents of political development. Hardin concludes that the attempt to formulate agricultural policies within strictly agricultural circles and then present them to the legislatures has in it several risks of buying short-term gains at the expense of long-run losses.[19]

It is not unreasonable to interpret virtually all of the developments pointed to in these remarks against a basic contrast between a market economy of specialization and the traditional farm economy of a self-sufficient peasantry. The American economy is greatly influenced by market relations. Putting the issues in this context has the merit of permitting some possibly meaningful comparisons of the American situation with that of other countries. In some very illuminating remarks on French philosophy in the nineteenth century, the late G. H. Meade observed that the French Revolution failed on every point excepting one: the distribution of land to the peasants.[20] A part of this failure was the unsuccessful attempt of Napoleon to dominate Europe. But politically the consequences were devastating; the peasants became satisfied and wholly preoccupied with their land-holdings and their cultivations. City and country have since been separated by a cultural and political void. The peasants have insulated themselves from the world by a devotion to traditional agriculture and endless hours of labor.

In Britain, however, the pattern was different. The peasants were fenced off the land in the ruthless era of enclosures, whereby the peasants became a drifting mass of potential factory and hired farm workers. The consequence today of this is to be found there in a basic identity of laborism and nationalism. The British method of market economics forced the people torn from the land to become dependent upon the economy as a whole.

The United States seems to be well on the way to achieving economic interdependence, in the British pattern, with a maze of basic market involvements facing the farm business. It is this which sets the problem for the survival of the family farm in America.

The traditional viewpoint of the peasant—around the world—has been to cling to his land, keep market risks to a minimum, and ask only that his government leave him alone. The first principle of the politics of American farmers is a reliance upon government action to help them achieve tolerable economic security in a market economy. Circumstances of population, political procedures, and economics all contribute to force the American farmer into an integrated relationship with other groups in

[19] Charles M. Hardin, "The Politics of Agriculture in the United States," *this Journal*, Vol. XXXII, No. 4, Part I, November 1950, pp. 571 ff.

[20] G. H. Mead, *Movements of Thought in the 19th Century*, Univ. of Chicago Press, 1936. Appendix.

the society. As a minority group he cannot hope to retain privileges of isolation. There may be many roads to the further integration of agricultural people into the total political economy of our times, but such integration appears to be a prerequisite to general economic and social progress. If so, this helps to set the problem of world economic development.

DISCUSSION

H. K. LECKIE
Council of Canadian Meat Packers

I think we would all agree with Mr. Vermeer that he was handed a rather tough assignment in tracing the trends in farm size and organization in the United States in the relatively short time allotted to him. However, he wisely limited his field by endeavouring to pick out general trends common to most farm types, and where necessary to indicate variations and differences.

It is evident that the existence of an unbroken series of farm management data is very useful in keeping tab on changes in farm size and organization. Although the BAE series extends only back to 1940 and covers only 16 main types of commercial family farms, it is more complete than anything we have in Canada. We usually have to rely mainly on census data, and at the present time are awaiting with interest the tabulation of 1951 records. Periodic farm management studies do afford a useful but irregular series of stepping stones. Some of our studies, such as the dairy farm business projects, which our Chairman, Dr. Patterson, has been associated with, have extended over more than one year. Here at the Ontario Agricultural College, continuous cost records were maintained for several years in the 1920's, then discontinued. In 1946 a continuous farm management project was started, and resembles in miniature the BAE project.

As Mr. Vermeer pointed out near the start of his paper, there are always difficult problems in the selection of an adequate measure of farm size. He mentioned the most commonly used measures together with their shortcomings, but I was interested to note that he made no mention of productive man work units. Apparently the "total input" measure used in the BAE studies is considered to be more satisfactory on the whole, although Mr. Vermeer did not go into the technical problems of computing this measure, of which there must be several. The table presented, showing the actual and percentage changes in total inputs by farm types in various periods, is very informative.

The most significant changes in farm business organization which he discussed were:

(a) mechanization
(b) amount and distribution of farm investment
(c) amount and proportion of inputs
(d) changes in farmers' financial position

To me the increasing farm mechanization is the most significant of these trends. In fact, most of the other changes noted tie in rather closely with mechanization, if they are not directly a result of it.

I was rather interested to note that the average U.S. farmer had a smaller

inventory of machinery in 1940 than in 1930. On checking, I found the same situation existed in Canada. Presumably a good deal of depreciation was written off in the 1930's when the rate of replacement was low, and labour was not such a pressing problem.

With machines changing rapidly in price, type, and capacity from 1940-50, it is hard to keep comparisons straight, but Mr. Vermeer presents rather convincing evidence of the changes by various farm types. In Canada the same trend has been in evidence.

Comparisons of farm investments are always subject to the limitations of valuation techniques, particularly in the case of the farm property itself. As Mr. Vermeer points out, changing price levels, as well as changing farm size, affect the total investment. I thought that it might have been well to introduce percentage figures in discussing the changes in combination of farm assets.

Changes in the nature of farm inputs were brought out by computing cash input values based on constant prices. On this basis, it is significant to note the less important place now occupied by labour among other input factors on most farm types, particularly those tending most readily toward a high degree of mechanization. While Mr. Vermeer did not say so, decreasing size of farm families and freer movement of farm boys to urban employment are closely associated with this trend.

Two measuring rods were applied to indicate changes in farmers' financial status. A decrease in the "operating ratio" was noted in recent years, attributed to higher total production, yields, and prices. Probably the higher value of output per dollar of input is not much more than is required to allow a margin of reserve for increasing vulnerability to price changes or crop failure.

The second financial yardstick applied—the ratio of net farm income to investment—also shows an improved picture. Even with larger investments today, successful farmers can apparently hope to get out of debt faster, providing they prove capable of managing their personal finances wisely. I am fairly sure that this ability has not increased as rapidly as farm income. The growing concern over family farm business arrangements indicates this to be the case. As Mr. Vermeer pointed out, farmers whose capital has been accumulating over the past few years are in a considerably sounder position than those just now starting or fairly recently established.

Until the 1951 agricultural census results are available in Canada, we lack considerable statistical evidence as to farm trends, particularly in the 1941-51 period. However, recent farm management studies and other data indicate that the trends are very similar to those already noted in the United States. Any differences are largely in degree. Our range of farm types is somewhat narrower than in the United States, but the same tendencies toward larger operating units, a higher degree of mechanization, higher capitalization, and greater proportion of cash inputs are in evidence. As in the United States, the commercial family farm is the predominant type of farm business organization.

So much for the facts—now what of the implications?

Implications

In view of the time available, Mr. Myers and I arrived at a working agreement that he would concentrate on the paper prepared by Mr. Owen and Mr. Parsons. Therefore I will confine my remarks on the second paper to certain phases which are of particular interest to me.

I am especially concerned with the implications of these trends insofar as they seem likely to affect the future of the family farm. Already we have had to have a re-definition of a family farm with reference to the constitution of its labour force. No longer do we consider that family labour need constitute the bulk of labour inputs. Perhaps, as Dr. Parsons and Mr. Owen suggests, the next stage will consist of an adjustment in the capital-ownership position. If farm land becomes more and more expensive, it is possible that efficient family farm business units may not be able to afford to own all their fixed capital. In Canada, farm tenancy is much less commonplace than in the Corn Belt, although in western Canada various systems of cash and crop share renting are much commoner than in the East. Keeping the farm in the family is a tradition which dies hard in our older settled areas.

In any event, the increasing difficulty being experienced by farm people in working out capital transfer arrangements from one generation to the next will not get any easier as farms become larger and more highly mechanized. Maybe, as the writers suggest, it is too much to expect that investment, labour, and management functions can continue to be adequately combined in the one farm family unit if the average size of the farm firm continues to increase.

Personally, I view with rather mixed feelings any rapid trend toward a greater flow of private risk capital into agriculture. While in many respects agriculture has been hampered by capital rationing in the past, I find it hard to long for the day when professional farm management and appraisal services will permit farm ownership to pass freely into nonfarm hands. Once farming yields some of the philosophic strongholds inherent in a system of family farms owned and operated through successive generations, I feel that our rural life will lose much of its present strength and stability. I am inclined to agree with Dr. Parsons' and Dr. Owen's conclusion "that if the survival of the family-type farm is to be seriously challenged, it is not likely to be on the open field of operating efficiency."

I am not unduly concerned over the possible undesirable effects of farm mechanization. Systems of cooperative and custom use of farm machinery, supplementing outright ownership of a few key machines, should enable farmers to keep machine overhead costs to a reasonable level. One of the commonest pitfalls is the tendency to buy untested machines, which involves a whole series of associated new management practices soon obsolescent. All in all, however, I am inclined to believe that the strictly economic implications of changing farm scale and organization will in the long run be secondary to the possible social, political, and philosophic repercussions.

DISCUSSION

MAX MYERS
South Dakota State College of Agriculture

Farm businesses are growing larger and more commercialized. These are the salient points of Mr. Vermeer's paper and the points of departure for Dr. Parsons and Mr. Owen. We agricultural economists may and do raise interesting questions concerning the unit of measurement of farm size or the degree of increase in time or location. We can, and should, discuss what all this means to the farmers and to the nations, but we should not let our questioning and discussion obscure the reality of the trend toward larger farm businesses.

Although I hold a normal professional desire to question, alter, or supplement Mr. Vermeer's presentation just on general principles, I do not find myself able to do so to any serious extent. Mr. Leckie has already touched on several items of importance. I find myself in agreement with what has been stated.

I do wish to emphasize the important trend toward complete mechanization. This is increasing the productivity per unit of labor, particularly of family labor. I wonder whether we in farm records work have not lagged behind the trend when we attempt to put an equivalent value on family labor. We probably underprice the farm-boy mounted on a modern hydraulic-equipped, almost jet-propelled tractor, bearing or towing the latest in automatic, supercharged equipment.

Messrs. Parsons and Owen have listed several developments related to changes in farm size and organization and outlined implications thereof. One of these is the increase in wage rates for farm labor, consequent reduction in use of regular hired men, and the increasing importance of family labor and seasonal hired labor.

It seems to me that the more important of the implications for the majority of farms is the increased proportionate use and productivity of family labor made possible by mechanization and specialization. However, in a community where the increased emphasis on seasonal labor may apply, the sociological implications probably will be more noticeable and serious, and will bear on the whole community, not just on agriculture.

Another interesting development mentioned by Messrs. Parsons and Owen is that of a "glacial drift of greater differentiation of economic function within our farm economy." They followed this with a discussion of ownership of land by investors, the growth of professional management services, and the effect of increased capital requirements on prospective farmers.

Undoubtedly, as total capital investment per farm increases, there is more opportunity for a differentiation in economic functions. The increased importance in the land market of investors and the activities of professional managers are more noticeable in the vicinity of large cities than they are in the wide open spaces. In my State of South Dakota, for example, a careful study of land sales during the period 1940-1951 did not discover any important amount of investment buying or any serious effects thereof.

The difficulties of capital accumulation and of obtaining land ownership have been mentioned. I am of the opinion that the over-all process for the farmer of attaining a desirable level of family living and becoming an owner is faster, easier, and more comfortable today than in previous decades. However, the first steps in the process, those involved in getting into farm operatorship, may be more difficult.

The possibility mentioned of provision of management guidance to young farmers, at an increased interest charge, but with decreased requirements for owned equity, raises again the interesting question of responsibility. If young Farmer Jones loses several thousand dollars on a venture instituted by the urging of his "official" farm management advisor, then who is responsible, legally or morally? This could have political and policy aspects.

The reading of these papers did not arouse in me any strong feeling of disagreement on major issues. Rather it started me thinking of other implications of the trends toward larger, more commercial farm businesses. I wish to mention several of my preliminary mental speculations.

On the economic side, the trends in farm size and organization which have

been mentioned point to an increase in facilities for servicing the larger and more specialized farm businesses. This implication and others indicate that there will be increasing interdependence among farmers, and among farmers and other businessmen.

It seems to me that there are many sociological implications of these trends. These include:

1. Possibility of considerably decreased birth rates in the long run on more commercialized, specialized family farms.
2. Need for increased educational effort with all age groups of farm people, along technical, business, and policy lines, in order to keep up with the problems of a "snow-balling" technological advance.
3. Some adjustments in social institutions and services which may have fewer families of people more interested in writing checks for donations than in donating personal services.
4. Changing rural attitudes toward business practices and ethics, as well as toward other social values, leading to a narrowing between rural and urban attitudes.

The discussion and speculation are interesting and pleasant. The continuing trends in farm size and organization are very real. They do not wait for economists and sociologists to call the signals. It is our task to keep pace and to look beyond today's reports.

AGRICULTURAL COOPERATION

Chairman: J. E. Lattimer, Westmount, Quebec

DEVELOPMENTS IN CANADIAN COOPERATION

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THE midpoint of a century is an appropriate time for stock-taking in many lines of activity and, in this regard, cooperative activity is no exception. This is one good reason why an assignment to outline the developments in Canadian cooperation is an attractive one. A further reason, which becomes apparent upon examination of the relevant data, is that the over-all picture of Canadian cooperative activity can be outlined in such convenient round numbers. Among the relevant facts are the following: first, that Canadian commercial cooperatives are currently doing a business of a billion dollars a year;[1] second, that this represents an increase of 500 percent over the prewar figure; and third, that over 90 percent of the business of Canadian commercial cooperatives is agricultural in origin, with four fifths of it representing the marketing of farm produce and the remainder made up largely of the purchase of farm equipment and supplies. Considerably less than 10 percent of the total of cooperative commodity transactions in Canada is made up by the sales and purchases of fishermen's cooperative organizations and by the purchases of consumers' goods for rural and urban dwellers. The latter may properly be regarded as consumers' cooperative activity, and its small proportions are a significant but well recognized feature of the Canadian cooperative picture.

Apart from the commercial cooperatives, which we may define as those which deal in commodities, there are in Canada a great and increasing variety of service cooperatives. More will be said of them later. At this point we need only note among them the predominance of financial cooperatives, such as credit unions and those dealing in insurance, the latter comprising particularly the numerous and well established farmers' mutual fire insurance companies. A total of approximately 400 farmers' mutuals carry a total fire insurance risk of 2.25 billion dollars.

Since Canadian cooperatives market farm produce to the value of 800

[1] Data on Canadian cooperatives are assembled and compiled by the Economics Division, Marketing Branch, of the Canadian Department of Agriculture, and are published in the *Annual Summary of Co-operation in Canada*, issued by the Department. The text of the Nineteenth Annual Summary, to be published in August, 1951, was made available to the author through the courtesy of the staff of the Economics Division.

million dollars a year, it is obvious that they are of substantial relative importance in the agricultural marketing field. For the cooperative year ending July 31, 1950, it was estimated that cooperatives handled 35 percent of all Canadian farm produce entering commercial channels. For grains, the cooperative proportion was 60 percent, and for all other farm produce as a group, 25 percent. Over the past 10 years Canadian cooperatives have increased their share of total marketings of all farm produce and of all the major classes of such produce.[2] While they now handle appreciably more than one third of all farm produce, in 1941 they handled less than one quarter of the total.

The marketing of grains comprises upwards of one half of Canadian cooperative marketing business. The relative gains of the cooperatives in this field have been less in recent years than in the handling of other commodities, such as livestock and dairy products. As early as the middle nineteen-twenties, Canadian cooperative organizations were marketing one half of the total grain crop of the country. Three of the four great grain handling cooperatives of western Canada, the three provincial pools, recently celebrated their twenty-fifth anniversaries. The fourth one, the United Grain Growers Limited, was created in 1916 by the merger of two already well established grain handling cooperatives, and traces its origins to the formation of the first of these in 1906.

The magnitude of cooperative grain marketing business contributes to a pronounced regional concentration of Canadian cooperative activity in the Prairie Provinces. From one half to two thirds of the total dollar volume of cooperative transactions has in past years been accounted for by cooperative associations in these provinces. Saskatchewan associations alone have accounted for from one fifth to one third of the total. For 1949-50 the Prairie Provinces' proportion was one half, and Saskatchewan's was one quarter of the total marketing and purchasing volume combined. Considering the sale of farm produce alone, cooperatives in the Prairie Provinces did approximately 55 percent of the business, and Saskatchewan cooperatives approximately 30 percent in the same year. Cooperatives in Quebec and Ontario considerably out-distance those of any other province in the purchase of farm supplies and consumers' goods. Quebec cooperatives purchased one quarter of all cooperative purchases in 1949-50.

Over the past decade or two the purchasing, or farm supply business,

[2] The percentages of various groups of commodities handled by Canadian cooperatives in 1949-50 are as follows with the corresponding percentages for 1940-41 in brackets: Grains and seeds, 60.6 (49.7); livestock, 18.7 (12.3); dairy products, 27.9 (16.1); fruits and vegetables, 35.8 (17.3); poultry and eggs, 15.3 (11.1). *Cf. Nineteenth Annual Summary of Co-operation in Canada*, Canada Department of Agriculture, 1951, p. 6.

of Canadian cooperatives has increased steadily in relative importance as well as in absolute volume. In 1940, cooperative sales of farm produce were 10 times the value of cooperative purchases; in 1950 the corresponding ratio was only four to one. A list of the commodities and groups of commodities purchased cooperatively by Canadian farmers reflects the rural impact of technological changes which have occurred within the past generation. The substantial cooperative purchases of petroleum products and auto accessories form the most obvious case in point. Tractor fuels and greases produced by the cooperative refinery which was opened at Regina in 1935, the first one to be established on the continent, is the chief constituent of this item of turnover. Feed, fertilizer, and spray materials, which collectively constitute one third of the purchasing business of Canadian cooperatives, are, as a group, another evidence of changes in farming methods. Beginning with World War I and over the decades since, there have been revolutionary advances in the knowledge and processes relating to the preparation of livestock and poultry feeds and commercial fertilizers. Agricultural cooperatives have been actively engaged in the preparation and distribution among their farmer members of the products of the newer formulae.

The decade and a half since 1935 has been a period of exceptionally rapid expansion in cooperative organization. Three quarters of the associations in existence in Canada today originated during that time.[3] In every province except Saskatchewan, the years from 1941 to 1945 were the most active in terms of the formation of new associations, and throughout Canada upwards of 1,000 were organized in that five-year interval. For Saskatchewan, the five-year period from 1936 to 1940 was particularly active with the formation of over 300 new associations.

The continued expansion and increasing diversity of Canadian cooperative activity raise questions concerning motives and underlying philosophy. Is it possible to observe any single basic purpose behind the multiplicity of cooperative organizations and activities? If it is possible to do so, can we trace any uniformity in this purpose throughout the decades, or has the purpose been altered in its essential features from time to time? The answer to these questions is that Canadian cooperative activity has had and continues to have as its well defined and consistent objective the removal or amelioration of specific injustices within the economic structure. This answer, however, requires elaboration.

There are two views concerning the proper function of organized cooperative activity in its relation to the general economic framework. It is regarded by some as an eventual alternative to the free enterprise

[3] See J. E. O'Meara, "Some Aspects of Co-operative Business in Canada, 1948," reprinted from *The Economic Analyst*, Vol. XX, Nos. 2, 3, 4 and 5 (Ottawa, 1950).

system, as well as to socialism and all other forms of statism. By others it is regarded as an effective instrument for the correction of some of the abuses of the free enterprise system, a means of making the existing economic system work with less friction. The former view finds expression in the concept of the "cooperative democracy," as advocated notably by Dr. J. P. Warbasse in the United States, as well as by a number of Canada's cooperative leaders. Most Canadian cooperators, however, consider such a concept to be visionary in the extreme. They are nothing if not economic realists. They live in a free enterprise economy and, whatever their views concerning the ultimate social and economic ideal, they regard cooperative endeavour as a highly flexible instrument for the removal of specific economic injustices or for the correction of some inadequate condition which they encounter in the serious business of earning their daily bread.

The specific injustices which appear to be at least partially remediable by cooperative action show up in a wide variety of circumstances. For the most part, however, they are closely related to one significant underlying condition, that of inequality of bargaining power in the markets in which particular groups must buy and sell. If we recall that Canadian cooperative activity is almost entirely the work of agricultural producers, we can see that the relevant inequality of bargaining power is that which the Canadian farmer encounters in the markets in which he sells his produce, and in which he buys the equipment and supplies necessary for his farming operations.

The inferiority of the agriculturist's bargaining power is a readily observable feature of the free enterprise economic system. Furthermore, it may readily be explained. The free enterprise system is frequently called a competitive system. One of its basic assumptions is that the search for maximum profits is a natural and normal procedure, to be deprecated and restrained only in exceptional circumstances. The resultant paradox is, however, that competition destroys profits, that high profits can only be maintained by the restriction of competition. The natural aim of producers in the "competitive" system, therefore, is to avoid competition wherever possible, either by the achievement of a monopoly position or by the negotiation of agreements among producers who would otherwise compete. The ability to stifle competition varies in a general way in inverse proportion to the number of producers in a particular field.

The position of the farmer in relation to those with whom he does business thus becomes clear. Whether we have in mind the wheat farmer, the livestock or dairy producer, the fruit or vegetable grower, or the producer of specialty crops such as wool, tobacco, honey, or fur, it is a rare instance where there are not hundreds or thousands, even hundreds of thousands, of farmers competing in the same market with the same product. Price agreements, quantity restrictions, orderly marketing—any

of the paraphernalia effective in the suppression of competition, in fact—are in such circumstances beyond the reach of producers.

The fact that farmers compete actively among themselves need not, of course, place them in a position of inferior bargaining power, provided that the other groups in the market, those to whom the farmer sells or from whom he buys, are equally competitive among themselves. But this proviso points up the dilemma sharply. Farmers, who in their market dealings find competition among themselves almost totally unavoidable, rarely deal with groups who are forced to operate under conditions of unrestrained competition. Occasionally they are required to deal with a full-fledged monopolist. More commonly, they face the situation in which, with the surface appearances of competition very much in evidence, tacit or formal agreement, or price leadership under a powerful market leader, has removed all but the barest trace of effective competition. Under these circumstances, the active competition imposed upon the farmer places him in a position of gross inequality in bargaining power in every essential market.

Since the possibilities of restricting competition vary inversely with the number of producers involved, it is important to indicate why there are so many farmers in each line of agricultural production and so few producers of many of the goods and services which farmers must buy. The answer lies in the economies of large-scale production, in the fact that unit costs in every line of economic activity tend to be reduced by an increase in the scale of production up to a point, and that if the scale is further increased, unit costs tend to rise. In some lines of production, the optimum point in terms of unit costs corresponds to an extremely large concern; in others, it is met before the concern expands beyond the small-scale size. Most manufacturing and processing industries, as well as transportation and warehousing concerns, are in the former category; agriculture falls in the latter.

There are great opportunities for social gains in the low cost mass production of large industrial enterprises, gains in which farmers as consumers may have a share. But groups which are compelled, as farmers are, by the economic conditions of their type of productive activity, to enter buying and selling markets under the full rigors of competition, can only face the large-scale and at least partially monopolistic industrial interests in a comparatively defenceless position. This is bound to appear to farmers as one of the outstanding abuses of the economic system, and an abuse which clearly requires correction.

The modification of competitive inequalities has consistently been the most important single objective of organized cooperation in Canada. Cooperatives may remove or reduce such inequalities either by absorbing the activity in which monopolistic elements exist, or by uniting the

products of many competitive producers for sale through a single "collective bargaining" sales agency. The first method is illustrated by cooperatives which own and operate facilities such as grain elevators, creameries, cheese factories, fruit and vegetable packing and canning establishments, and livestock shipping and terminal marketing agencies. The flour mill owned by the Saskatchewan wheat pool, the few scattered cooperative meat processing establishments and the cooperative refinery illustrate the same use for cooperative organization. Cooperative collective bargaining is illustrated by the Ontario tobacco marketing associations. Practically all marketing and processing cooperatives constitute centralized sales agencies for the combined produce of their members, and thus have greater or lesser possibilities as collective bargaining organizations.

The existence of great inequality in bargaining power as among different groups within the community is of such serious import that there is persistent pressure for governmental action directed towards its removal. Governments founded on free enterprise principles are severely handicapped in the matter, however, because they can scarcely recognize the acceptability of the producer's search for maximum profits and at the same time deny the use of monopolistic devices which constitute the most effective instrument employed in the search for profits. Canadian farmers have by no means overlooked the possibilities of government action directed toward the improvement of their bargaining position. They have, in fact, frequently undertaken the onerous responsibility of cooperative organization and operation only after it has been clearly demonstrated that the most persistent pressure would not persuade the Government to take such steps as the farmers thought to be required by existing circumstances.

The marked expansion which has characterized cooperative activity in Canada in recent decades leaves two of the essential characteristics of that activity unaltered. In the first place, organized Canadian cooperation remains essentially agricultural. In the second place, its main objective continues to be the improvement of the farmer's bargaining position in the markets in which he sells and buys. Apart from the pronounced increase in the volume of cooperative business, both absolutely and relatively, there are important developments to be noted in the field of Canadian cooperative activity. For the most part, these developments can be summed up as marking a significant trend in the direction of cooperative diversity. It might well be argued that the flexibility and adaptibility of cooperative organization, as demonstrated by developments in Canada within the past decade or two, constitute the most telling evidence available as to the efficacy of cooperative enterprise in coping with economic difficulties facing the agricultural producer.

The increasing diversity which marks Canadian cooperation is the

result particularly, but not exclusively, of expansion in the field of cooperative farm supply, not only of goods, but also of services. A great range of possibilities exists for the organization of cooperative agencies to provide services in rural communities, and Canadian farmers have, within recent years, employed a considerable number of them. Among these are rural medical and hospital cooperatives, rural electrification associations, cold storage locker organizations, and cooperative organization for the provision of a great diversity of services such as trucking, snow plowing, feed grinding, the hatching of eggs and the operation of vacation camps. Any attempt to enumerate the many types of rural service cooperatives in operation throughout the Canadian provinces would add much tedious detail and would do little but underline an inescapable impression of the adaptability of the cooperative device to rural economic needs. A few of the more important of the individual developments merit closer attention..

The very great expansion of credit union activity in recent years constitutes one of the significant trends in the field of cooperation. In December, 1950, there was celebrated the fiftieth anniversary of the founding of the first credit union in North America, *La Caisse Populaire de Levis* in Quebec. In 1906 the Province of Quebec enacted legislative provision for credit union organization. With the failure of similar legislation to pass the Canadian Senate in the same year, the Quebec statute remained the only one of its kind in Canada until 1922. In that year Ontario passed credit union legislation. It was not until the nineteen-thirties, however, that credit union organization spread throughout the other provinces. By 1939 all provinces had special legislative provision for the formation of credit unions, and in that year there were 844 credit unions in Canada. Ten years later there were over 2,800. Over the same 10-year interval credit union membership increased more than sixfold, from 151,000 to 940,000, while the assets of the unions increased nearly fourteen-fold, from $21 million to $282 million. In 1949 these organizations loaned approximately $100 million to their members. In addition to the local credit unions, each province has one or more central organizations to act as agencies of deposit and loan for the locals. Credit unions are not exclusively rural; nevertheless, they operate mainly in rural communities.

Turning more particularly to the purchase of goods as distinct from services, we must take note of the considerable expansion in the business ordinarily described as cooperative farm supply. Organization in this field demonstrates both horizontal and vertical expansion, a growth of activity taking place both by the forming of new associations at the retail and wholesale levels and by reaching back to secure control over the manufacture and obtainment of necessary raw materials. While cooperative purchasing of the consumers' variety has ordinarily had its beginnings

at the retail level, cooperative purchasing in Canada in the agricultural field has a much firmer foundation of experience at the wholesale than at the retail level. The United Farmers' Co-operative Company in Toronto, reorganized in 1948 as the United Co-operatives of Ontario, was established in 1914, and is thus one of the oldest farmers' cooperatives in Canada. It has operated in the business of farm supply essentially at the wholesale level. The farm supply business of the United Grain Growers had its origins at the wholesale and the retail levels in the early years of grain growers' cooperation in western Canada.

Recent developments in this area of agricultural cooperation include the expansion and interprovincial federation of the wholesale business, the multiplication of cooperative retail outlets under the stimulus, to a considerable extent, of the wholesale organizations, and the extension of control by the cooperative wholesales over sources of supply at the manufacturing and raw material levels. Eleven cooperatives mainly engaged in wholesaling farm supplies and consumers' goods had manufacturing plants and warehouses in 25 places in 1950, and were owned through federation by 1,850 local cooperatives. At the same time, eight regional wholesales had federated to form Interprovincial Cooperatives Limited to serve as a central purchasing agency for the procurement of supplies in the domestic and import markets. The member wholesales have expanded into the manufacturing business on an individual basis. They own two dozen production units, which include feed plants, canneries, abattoirs, a box factory, saw mills and an oil refinery. At the level of raw material control, the western cooperative wholesalers own coal mines and oil properties.

Two other substantial ventures in cooperative manufacturing have been started in western Canada within the past few years, neither one, however, under the ownership of cooperative wholesales. These are, first, the flour mill and oil extraction plant constructed in Saskatchewan by the Saskatchewan Co-operative Producers (Wheat Pool) and, second, the organization of The Canadian Co-operative Implements Limited with farmer membership in the three Prairie Provinces. The implement company represents large-scale cooperative organization for the purpose of securing farm equipment by purchase or manufacture. The flour mill and oil extraction plant represent a functional extension into the processing field by the major marketing cooperative in Saskatchewan, an extension which had not hitherto been undertaken by the cereal marketing cooperatives. The mill represents an investment of 3.5 million dollars by the company. During the crop year ending July 31, 1950, its first full year of operation, it milled 1.375 million bushels of wheat and averaged 1,200 barrels of flour per operating day for a total of 325,000 barrels.

The implement company was organized in 1940, but its operations were delayed until 1944, when with the assistance of the three Prairie Province Governments, a small implement factory was purchased in Winnipeg. This made possible the production of light equipment, such as sleighs, wagon boxes, and small tools and implements. More recently, the cooperative factory has developed certain specialty lines, such as a disker with seeder attachment, and a harrower. The major source of supply for C.C.I.L., however, rests in a contract with the Cockshutt Plow Company. This contract, first negotiated in 1945 and renewed from time to time, assures the cooperative of a supply of the more highly technical modern machines, such as tractors, combines, swathers, and tillers. The implement cooperative has a membership of approximately 50,000, and its annual sales for the past two years have averaged five million dollars. Total savings for the six years of active business operation to October 31, 1950, are reported at approximately three million dollars.

An example of small cooperative beginnings with prospects for future expansion is provided by the cooperative farms which have been organized in Saskatchewan since 1944. They are classified by provincial officials as "labour production co-operatives," and those who work on each farm own it and control it on the basis of one member one vote. There were 20 of these farms in Saskatchewan in 1950, the first two organized in 1945. Nine of them were organized by groups of war veterans who leased blocks of Crown Lands from the province and partially financed the venture with their individual Veterans' Land Act grants. The leases with the provincial government are for 33 years; they are renewable, and carry the option of purchase at the end of 10 years. The remainder of the cooperative farms were organized by groups of established farmers who merged their land in the cooperative ventures. These farmers listed and valued their land, livestock, and equipment, and transferred it to the cooperative as loan capital on which interest is payable. The 20 farms have a total membership of 210, with a membership per farm varying from five to 18. The farms vary in size from 1,200 to 9,500 acres.

FINANCING FARMER COOPERATIVES

HAROLD HEDGES
Farm Credit Administration

AT THE outset, let me express my personal regrets that Dr. Fred Koller of Minnesota found it impossible to handle this subject, making a substitution necessary. In case some of you are unaware of it, Dr. Koller spent his sabbatical leave about three years ago with the National Bureau of Economic Research on a research study relating to the financing of cooperatives. It was the privilege of a number of us in Farm Credit Administration to have frequent contact with him during the course of his assignment, and to provide him with some of the basic data used in his research. I, for one, am most anxious to see the published report of his study, and trust it may soon be released. Beyond that, I hope we who are concerned with problems of farmer cooperatives may be able soon to tap Dr. Koller's fund of knowledge and get from him still another publication—one which farmer directors and others concerned with organization and management matters may use in building or rebuilding, on a sound basis, the financial structures of farmer cooperatives.

If you will keep in mind that I am only substituting for one who has had unusual opportunity to analyze the financial structure of cooperatives, I shall proceed in my own way to discuss the subject. I feel quite sure my handling of it will be quite different from Dr. Koller's approach. I must talk in more general terms based upon my years—and they number quite a few—of contact with the many problems of cooperatives, rather than on a specific analytical study of financing. Perhaps it is my two years of experience as an officer in one of the 12 district banks for cooperatives about 15 years ago which qualify me as a substitute for Dr. Koller.

In approaching the subject of financing cooperatives, I believe it is well to have in mind the nature of capital in a cooperative business organization. After all, the central problem of financing is that of assuring adequate capital for the effective operation of the business, be it cooperative or non-cooperative. Nevertheless, capital in a cooperative has characteristics which differentiate it from capital in a non-cooperative or profit-seeking corporation. These distinctive characteristics have their genesis in the basic concepts of the cooperative corporation—the so-called principles of cooperation—which distinguish the cooperative from other forms of business organization. At the risk of oversimplification, let me attempt a hasty review of these basic concepts and relate them to the matter of financing, before getting into a consideration of the problems and practices of cooperative finance.

One of the basic concepts of cooperative organization is that of ownership and control by those who utilize the services of the organization—marketing, purchasing or whatever they may be. Certainly financial policies, methods, and practices are involved in this matter of patron ownership and control. The "one-man, one-vote" or other methods which relate control to patronage, rather than give control in proportion to the ownership of capital shares, suggest that capital in the cooperative may have its distinctive characteristics. A basic purpose of the revolving fund method of financing cooperatives—and I shall have more to say about it later—is to give greater assurance that ownership and control will remain in the hands of active patrons, and perhaps go so far as to roughly proportion ownership to use of the organization by each individual patron. A provision frequently found in cooperative by-laws disfranchises the owner of capital shares who ceases to be a producer or a patron. In short, capital has a distinctively different place in the control mechanism of the cooperative from its role in the profit-seeking business firm.

A second basic concept of cooperative business is operation at cost. I for one prefer to use the expression, "operation at cost," rather than "non-profit operation," because I believe it is somewhat more descriptive of this basic concept. The profit motive or the incentive of economic gain is as persistent—is as much a motivating force—in the cooperative business as in any other business firm. In a cooperative, instead of endeavoring to make a profit on their capital investment, members want to keep down cost so they can make a larger profit on their individual farm businesses. The element in business organization and operation which distinguishes the cooperative from the non-cooperative firm is tied in with the device or devices utilized to arrive at operation at cost—such distinctive devices as pooling and the patronage refund. In contrast, the element in profit-seeking business which is distinctive is tied in with the maximization of margins over cost. Capital as a cost factor necessarily has a different connotation in a cooperative than in a non-cooperative business firm. But more about this later.

We come now to the third basic concept of cooperative enterprise and the one most closely related to the subject of this paper. It is the concept of limited returns to capital. This contrasts with the status of capital in a non-cooperative or profit-seeking business firm, in which the primary motive for investment of share (or ownership) capital is to obtain as large a return as competitive or other limiting factors will permit.

All capital in a true cooperative is limited as to returns regardless of its source. Capital obtained by borrowings is subject to the interest rate limitations specified in the contract between the lender and the borrowing association. This also holds for the non-cooperative firm. Share capital

carrying preferments of one form or another is subject to the limitations on returns necessary to reflect reduced risks in repayment or assured dividend rates. This too holds for both cooperative and non-cooperative business. The point of distinction between the two lies in the status of the ownership capital—the capital associated with ownership-control of the organization. In the cooperative, such capital is subject to limited returns, as specified in the organizational papers, or in the statutory acts giving legal being to the organization, or both. In the profit-seeking corporation, such share capital is in a sense the "residual claimant" for all margins over cost, including in cost the payment for the use of the other forms of capital.

And in still other ways there are limitations on returns to capital in a cooperative. An accepted provision in the organization structure of cooperatives is one which limits the ability to transfer ownership stock and, hence, affects its value. Another puts a maximum of book or par value (whichever is lower) on the value at which shares may exchange, thus putting a top figure on any market value they may have. With returns and transferability limited, and with speculative values minimized, the ownership capital of the cooperative thus takes on some of the characteristics of loan capital. In contrast, the common stock of multiple-ownership, profit-motivated corporations has no such limitations as to returns or market values and seldom as to transferability. Hence, the payment for the use of share capital in a cooperative is sometimes designated as an interest payment rather than a stock dividend payment. The latter is, of course, the term in general use in corporation finance.[1]

The foregoing review of the three basic principles of cooperative organization—the concepts which distinguish it from other forms of business enterprise—serves to point up the fact that capital in a cooperative does have its distinctive characteristics. These in turn have their bearing on the problems involved in financing, some more directly than others. I shall have occasion to refer to some of them later as these problems are considered.

The capital needs in terms of amount may be no different for a cooperative business from those for any other form of business of comparable nature and scale of operations. Yet the element of risk as a factor influencing returns to capital as such is not as significant in cooperative business as for any other business firm. Its relationship to financial structure and

[1] Note: The line of reasoning just outlined is one sometimes used by those who advocate continuance of the tax-exempt status of cooperatives which meet certain conditions under the federal income tax statutes of the U.S. Carrying this reasoning further its advocates would look on these limited payments for use of member capital as an item deductible from income—an allowable business expense—rather than a distribution of profits from the business and hence subject to tax.

the problems of capital accumulation in a cooperative is, therefore, rather distinctive. Of course, the basic ownership capital, whether in the form of common stock or other evidences of ownership, is subordinate to other forms of capital—borrowed funds, preferred shares in their various forms, etc.—in any liquidation. This holds for all types of business. There is a distinction to be noted, however.

In the profit-seeking concern, the risk is assumed deliberately by the investor *as an investor* who weighs risk against potential returns from the alternative investment opportunities for his funds. In the cooperative, capital is provided by the member patron primarily to obtain the services of the organization, and the investment factor—maximized returns from the funds invested—is a secondary consideration. It is secondary since the decision to enter and to continue in an ownership capacity in the cooperative is made on the basis of opportunities for gain as a patron, not as an investor. And it is made secondary deliberately by the various devices mentioned above, namely, limitations on rate of return, on who may own, on transfer, and the like, all of which operate to reduce salability. In contrast, ease of transfer and ready salability are common characteristics of the capital stock of non-cooperative corporations having multiple ownership. This point of difference serves to emphasize the almost complete dependence of the cooperative on member-patrons for initial capital, whereas non-cooperative firms usually have opportunity to tap a variety of sources for original capital.

I shall not go further in attempting to analyze the impulses of individuals which motivate the flow of capital to business organizations. I am convinced, however, that the distinction between cooperatives and other forms of business in this regard is significant, and hence has a bearing on financing methods and practices. The need for capital to facilitate economic activity is as urgent in a cooperative as in any other business firm. The job of financing is one of implementing that need. For the cooperative it may be a simple one, or it may involve many of the intricacies of capital accumulation and management to be expected in large scale business. But basic to sound solutions of these financing problems is an understanding of the things which make the cooperative a distinctive form of business enterprise, together with a knowledge of business finance generally. This is an area for research worthy of attention beyond what it has received to date.

From this point on, I shall direct my discussion to some of the more concrete problems of capital accumulation and management in farmer cooperatives. These involve the planning and administration of financial structures which will contribute to their success as farmer-owned and farmer-controlled business enterprises. A first and basic problem relates to

ways and means of accumulating the original or basic capital for the association. The responsibility for providing such capital, or for underwriting it, rests with the member-patrons. After all, they are the ones in position to receive direct gains from the services it is expected to render. The basic elements of an adequate financial structure, as I would conceive of it, would be about as follows: Sufficient capital would be provided by prospective patrons, roughly in proportion to expected patronage, to cover (a) the investments in fixed assets required for sound operation, and (b) the minimum operating needs of the business. This member-patron capital would provide adequate security for short-term borrowings to cover peak operating capital needs at reasonable interest rates.

Such an ideal situation is seldom attainable in the organization and original financing of a farmers' cooperative. Quite the contrary. Generally speaking, few farmers in any given area have ready funds in any substantial amount for off-farm investment, even in good times. The impetus for cooperative action on the part of producers usually comes, and properly so, from economic need. This need more often than not tends to be associated with lack of capital funds. The net result is that the proportioning of original capital to prospective use of the association is not possible. And more often than not, off-farm sources of capital must be tapped, with the hope that the latter can be replaced by patron capital later.

Whatever the situation, it is important that the original financing of the cooperative be both sound and adequate. It should be backed up by a carefully developed plan for capital accumulation. Certainly the all too frequent tendency to launch the undertaking before sufficient capital is in sight should be curbed. Experience has proved that sound financial structures can be developed under either the stock or nonstock forms of incorporated associations. This being the case, any discussion of the merits or demerits of the two forms seems pointless. Furthermore, I shall dispense with discussion of the various types of stock, certificates, etc., which have been developed to reflect the membership and ownership rights of the holders. They are simply a detail in the development of the organizational set-up.

What are the elements of a sound financial structure for a cooperative? Obviously, in view of my earlier discussion, it should give assurance of patron ownership and control, both present and future. It should be adapted to the nature and scope of operations of the organization. It should provide ready means for capital accumulation from member-patrons, both for retirement of capital obtained from nonmember sources and for future expansion. It should facilitate the opportunity of the organization to tap commercial sources of credit if or when needed. Each

of these points I have listed warrants some further explanation.

First, how may the financial and organizational structure serve to give assurance of patron ownership and control? Patron ownership and control are seldom a question of any concern at the time of organization if the impetus for starting came from producers and resulted from their real economic need. The major problem is that of retaining the patron influence throughout the life of the cooperative. I already have had occasion to mention some of the devices utilized for this purpose, namely, limiting voting privileges (and hence control) to active producer-patrons and providing for prompt liquidation of the financial interests on nonpatron members. Another device is to provide means for bringing new patrons into membership status promptly. There is, for example, the revolving fund method of financing, about which I shall have more to say below. One of its objectives is, of course, to insure that ownership and control will remain always in the hands of active patrons.

At this point, I might comment on the use of the cooperative pattern to carry forward desirable government sponsored programs. Two good examples are the farm credit and rural electrification cooperatives. Provision is made for gradual retirement of government funds used to finance the programs out of savings from operations, thus shifting the ownership from the government to the patrons using the services of the association. A major problem here is one of developing member interest and responsibility as the transfer of ownership moves along.

A second point listed above and one which seems quite obvious is that the financial structure should be adapted to the nature and scope of services to be rendered by the organization. The financing method and financial structure of a pooling type cooperative would differ from those of an association which operated on the basis of going prices and the prevailing margins of the industry. Risk is a major factor accounting for the difference. In the pooling cooperative the price risk remains primarily with the growers, usually as a group, until final settlement for the commodity handled is made. The commodity itself provides the collateral for most of the financing which is required. In the so-called purchase-and-sale marketing cooperative, price risk is usually shifted from grower to association upon delivery of the commodity. In the purchasing cooperative the price risk usually remains with the association until ownership of the supplies is transferred to patrons. In a sense there is a pooling of margins, and risk is taken into account in the establishment of such margins. Such differences in operating methods make for differences in capital structure.

A third point made above is that the financial structure should be such that provision is made for capital accumulated from member-patrons.

Proprietary business firms generally look to retention of earnings as their principal means of providing additional capital for expansion or other purposes. The *Statistical Year Book* reveals that the proportion of the profits of United States corporations after taxes which were retained as undistributed profits during the seven-year period 1943-49 varied from a low of 45 percent in 1945 to a high of 63 percent in 1947.

Cooperatives, like other firms, have looked to retention of savings or of margins over cost as a principal means of accumulating capital. In fact, they have been quite ingenious in devising methods of converting such retained savings into additional member capital and of making unit capital deductions from commodity proceeds due member patrons. Due to the necessity of using general corporation laws for incorporation and to a general tendency to follow known profit corporation techniques, cooperatives gave little or no attention to developing their own distinctive methods of handling retained savings prior to the current century. The nomenclature of profit corporations was utilized, and such retained amounts became "surplus," "reserves," or "undistributed profits." The book value of capital shares in successful cooperatives mounted, and the difficulties of bringing about the transfer of shares from nonpatron shareholders to active patrons increased accordingly. As cooperatives grew older this situation became more and more acute. The final outcome was that many cooperatives "degenerated" into profit corporations. Surprisingly, this process continues today in some degree despite the progress made in developing devices to offset this trend.

I have been unable to determine when the first steps were taken to convert retained savings of cooperatives into member capital or to provide other methods for continuous accumulation of capital from patrons. I know that as early as 1910 or 1912 the cooperatives organized by the National Equity Union had provision for accepting members by payment of a nominal amount in cash toward a share of stock—further payments to be deducted from patronage refunds until a prescribed minimum holding of shares was attained. This does not mean, however, that substantial amounts of unallocated surplus or reserves were not being set up in such organizations. In the Pacific Coast States, certainly as early as the first decade of this twentieth century, the device came into use of making retains for capital purposes on the basis of number of units of product handled for each patron.

Space will not permit discussion of the variety of methods used to convert retained patronage refunds into member capital or to allocate reserves utilized for capital purposes on a patronage basis. I do want to give a little attention, however, to some of the more highly developed means of capital accumulation involved in the revolving fund method of

cooperative financing. It plays a dual role in cooperative organization. One major function—and a highly desirable one, too—is to keep ownership and control in the hands of active patrons. The second function for which it can be and usually is used is the one of capital accumulation, to which I have referred several times above.

In brief, the idea of the revolving fund is to retain either the allocated savings of member patrons or the specific deductions for capital purposes authorized by patrons until adequate capital has been accumulated. After that point is reached, the newly retained amounts are used to retire in cash the oldest of the obligations representing such retained funds. At that stage the revolving process begins. The nature and techniques of revolving fund operation are deserving of detailed treatment because this method has come to occupy an important place in cooperative finance. I shall not attempt any further description of it here, however. Suffice it to say that it has been found workable under a wide variety of situations. Mistakes have been made and will continue to be made in operating it because it does have its limitations. It still needs more tests of experience.

The final point made in setting down the characteristics of a sound cooperative financial structure was that it should facilitate the opportunity of the organization to tap commercial sources of credit if and when needed. Historically, cooperatives have had difficulty in getting credit from commercial sources. They have gone to a capital market which was familiar with the balance sheets and operating practices of profit-motivated business firms. They have had to convince credit agencies of the soundness of unfamiliar financial structures, and of the security values of marketing agreements. The advent of the banks for cooperatives in the early thirties finally gave cooperatives ready access to the money markets, as well as a credit agency familiar with their problems and practices. As a result, commercial banks generally have acquired confidence in cooperative operations and objectives, and are no longer aloof to doing business with them.

What are some of the specific things which cooperatives need to consider in order to insure ready access to commercial credit? They need to keep their financial structures as simple as possible consistent with their individual capital requirements. A wide diversity of net worth items—stock, certificates, deferred patronage refunds, and the like—may be difficult to explain. Whether the certificates or other evidence of capital contributions carry a fixed rate of interest, whether such rate is cumulative, whether the certificates have definite due dates when they must be retired, all of these have their bearing on the credit rating of the individual cooperative.

Cooperatives have their own distinctive ways of carrying on their business operations. These call for accounting terms, operating statements, and other records which are descriptive of the operations but which may be unfamiliar to commercial bankers, hence, may cause misunderstanding. The development of federated cooperatives has meant that a substantial asset item in the balance sheets of member cooperatives may be that of investment in other cooperatives. This, of course, would complicate the analysis of the balance sheet, since an appraisal of the value of that item would involve analyses of financial statements of the cooperatives in which investments have been made.

No doubt there are other objectives than the ones I have discussed which should be accomplished by a sound financial structure, but I believe these are the most important ones. There is just one more aspect of cooperative financing to which I want to call attention, but one which I am in very poor position to discuss. I trust it soon can be the subject of intensive research on the part of someone. I am sure you will all agree that the member is a highly important factor in cooperative organization. He provides its business volume. He has primary responsibility for providing its capital. Is he unduly penalized in meeting this responsibility?

I have had occasion to refer to the fact that member-owned cooperative securities have low salability. Transferability often is restricted. Top valuation usually is held to par. These restrictive factors also reduce the value of the securities as collateral for personal loans if the member seeks to use them as such. He occasionally may have alternative uses of high priority for the funds invested in his cooperative. This problem of the member and his cooperative securities has not been solved, but some progress toward a solution has been made. Some of the California cooperatives have moved to develop securities which are more readily transferable, but which will not, at the same time, put the cooperative in a difficult position. They have gone further by providing a fairly ready market for the distressed member who feels forced to dispose of his holdings. I, for one, would like to have a thoughtful analysis made of this problem and of the efforts being made to find an answer.

Up to this point I have not had occasion to use some of the terms which you might well expect in a discussion of cooperative financing. I have not mentioned financial ratios, or budgeting of income and expenses, or audits. My emphasis has been on things which make the job of financing cooperatives something different from that of financing other business concerns. Perhaps those who are scheduled to discuss my paper will come up with more specific conclusions or recommendations.

DISCUSSION

LEONARD HARMAN
United Co-operatives of Ontario

Development

1. *Nearby Co-ops.* Had there been time for field studies at this conference, some interesting cases could have been found in the large milk-powder plant on the outskirts of Guelph, the premix feed mill in Guelph which is part of the Central service for a hundred local feed mixing units throughout Ontario; and within an hour's drive of Guelph, big and little farm supply co-ops with an infinite variety of achievements and of problems.

2. *Discussion Groups.* In the surrounding farm area here, there operates the greatest discussion group program in the world, Canada's National Farm Radio Forum. In this County of Wellington, throughout the winter on Monday evenings some 900 farm people meet for discussion, while in the neighboring county of Grey the number is 1,100. Although these Forum meetings have no direct connection with the co-ops, they have had tremendous indirect influence on the majority of co-operative developments in rural Ontario during the past 10 years.

3. *Federation of Agriculture.* This was launched and developed throughout Canada during the past dozen years as our general farm organization. The now past-president of the International Federation of Agricultural Producers was a farm boy near here and a graduate of this college.

4. *Commodity Groups.* What are the implications of Ontario's commodity groups in relation to cooperative handling? When one of 16 groups with marketing schemes, the Cheese Producers, reaches the place where it finances and handles the export deal for all our Ontario cheese going to Britain, to a value of six million dollars this year, we must pay attention. Is Ontario advancing rapidly into a form of large-scale specialized cooperative marketing, utilizing legislation and methods geared to a new era of economic planning?

5. *The Feed Grain Business.* How long will the co-ops of eastern Canada be integrating purchases of western feed grain before they employ one purchasing agent to bargain for purchasing most of the feed grain in Canada, as the farmer co-ops of western Canada now bargain on the marketing of most of their feed grain? Major farm organizations in East and West are opposed to irresponsible manipulation in Winnipeg and Chicago being permitted to fluctuate price and supply of grain to the continuous confusion of producers and purchasers, and at a loss to farm production and the general economy. When we finally eliminate the Winnipeg Grain Exchange in peacetime as well as in wartime, with what shall we replace it?

6. *Integration.* In most regions where there are local autonomous co-ops federated to form wholesales, there is much concern over the need for integration. May we call to your attention the survey conducted last year by Dr. Norman High of this College, on "Commercial Relations of United Co-operatives of Ontario and its Member Locals." One of the greatest opportunities for development lies in this field.

7. *Member Relations.* As centralization of management services grows to secure efficiency and integration, we must promote decentralized types of member or committee activity to develop farmer leadership and farmer participation. Member relations must reach far beyond patron relations if co-ops

are to constitute an effective people's movement, energized and guided by a flourishing democracy.

8. *Personnel.* Can we clarify adequately the proper functions of elected representatives and those of employed representatives? Can we who are in the co-ops grow as fast as the machinery? Can we find and develop successors to build structures which are effective and efficient and at the same time responsible and responsive?

Financing

1. We in Canada appreciate the loan services available to cooperatives by some provincial governments and certain grants by the Federal Government for particular projects; but we really have nothing to compare with the United States Farm Credit Administration. We in Canadian farm organizations have been lax in not pressing for such an agency. We should start now.

2. We are now in the midst of difficult credit restrictions which may bear much more seriously on cooperatives in Canada than in United States. Many of our co-ops have had rapidly growing capital requirements. In some cases they have depended too much on outside sources. Partly under Federal Government regulation and partly as a more conservative policy, the chartered banks are refusing increased credit to cooperatives as well as to other customers. At the same time the Co-operative Loan Service of the Department of Agriculture in Ontario is behaving the same way. Farmers in this country still suffer from an outmoded pattern of credit which serves them least when they need it most.

3. Canadian cooperatives have made a beginning in the transfer and use of cooperative capital among different types of cooperatives. Each of a number of provinces has a Co-operative Credit Society, a kind of provincial credit union with membership composed of all the various types of co-ops available. A provincial Credit Society might receive $5,000 today from a county medical insurance co-op and $5,000 from an urban credit union; tomorrow it might lend $10,000 to a farm supply co-op. A life or auto insurance co-op might operate its checking account through the credit society. A credit union or a medical co-op might hold debentures of the co-op wholesale. An insurance company might hold a mortgage on the plant of a marketing co-op. The people's money can be mobilized for the people's business.

4. Each region needs special services of appraisal and advice on capital use so that local enthusiasms may be tempered with experienced guidance. This should cover property, equipment, inventory, and receivables. It should take into account the usual factors of non-cooperative enterprise and those factors peculiar to a cooperative such as member service, member control, and member equity.

5. In another enterprise the investor may risk the prospect of loss as balanced against the prospect of gain. With the necessary fixed valuation on cooperative capital, we should be eternally concerned that the person who puts a hundred dollars into a cooperative gets it out again. This should make cooperatives particularly cautious on capital use. Only the well established ones can afford risky experiments.

6. In addition to provision for prompt full settlement with the estate of a deceased member, some co-ops have budgeted an amount available annually for retirement of investment to those who wish it. In some cases, five percent of the total investment would be sufficient to satisfy those few who wish to with-

draw. The co-op can neither afford to risk being expected to bleed itself to death, nor can it deny the wishes and needs of some of its members and friends whose requirements of money change, perhaps suddenly.

7. In Ontario we are at the beginning of experience with budgeting. This subject offers great possibilities for all sizes and types of co-ops.

8. There must be sufficient long term money. If the basis is loan capital, as is the case with most co-ops in Ontario, 20 years is a desirable due date for both cash investment, and patronage loans created out of deferred returns.

9. Whenever we receive or defer capital in a cooperative, we should plan for its repayment, and the members should have as much understanding as possible of the prospects of repayment. While the co-op should not be bound to early repayment of revolving funds, there should be a plan to pay out, probably in not less than seven years, and not more than 10.

10. One useful means of curbing the "investor complex" is to provide in the by-laws, or better still in the legislation or charter, that in the event of winding up, any surplus will be divided among the patrons of the last five years in proportion to their volume of business.

11. As in all other major aspects of cooperative development, the education of members and staff on cooperative finance is of tremendous importance.

DISCUSSION

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In commenting on Professor Fowke's paper, I can naturally say very little about the figures he has quoted, since they emanated from my own Division; however, there are, of course, some limitations and, as always, some duplication which cannot be easily eliminated. We do not have, for example, complete coverage of all cooperatives in Canada, but we estimate that we do report on about 90 percent of the total volume of business and about 65 to 70 percent of actual cooperatives now operating.

Professor Fowke has dealt at length on the purposes and reasons for the growth of cooperation among farmers. His reasoning in this phase is sound, but I would pose one question: If it is so obvious that farmers as individual producers must unite to combat "specific injustices," then why is it not as apparent that farmers as individual consumers should unite to combat similar injustices in the purchasing field? It has been noted that cooperative purchasing has grown rapidly in the last decade mainly in the field of farm supply, and as yet it has not amounted to any significant proportion of the total farm supply business in this country. I think it is encouraging, however, that more and more farmers are buying their supplies cooperatively and I think that in the future we shall see more of this. I would like to suggest also that in the field of consumer goods an increasing number of farm families should realize that cooperative purchasing of groceries, furniture, clothing, etc. is another way to cut down costs just as the cooperative purchasing of gas, oil, feed, and fertilizer is cutting down on farm production costs.

One major development in Canadian cooperation has been neglected by Professor Fowke, and that is the influence of the work of the Extension Department of St. Francis Xavier University at Antigonish, Nova Scotia. I am not anxious to say too much in praise of the work which has been done by this

university in the last 20 years, since I am a graduate of that university and at one time worked for the Extension Department. Therefore, may I quote from a very recent book by Miss Margaret Digby entitled "Agricultural Co-operation in the Commonwealth," and I would hope that these comments of Miss Digby's are sufficiently objective to emphasize the importance of the Antigonish movement: "It began to be known outside its native province at a time when the great depression of the early thirties had shaken confidence in easy economic progress in the United States; when co-operation in western Canada had been reduced to a grim business of holding on; and when, ten years after Desjardins' death, the old credit banks of Quebec had become static and conventional. The influence of Antigonish went far beyond the Maritimes. It enormously stimulated the credit unions in the United States, and the beginning of co-operation in the West Indies, Central America, and even further afield. It renewed a vivid interest in the popular banks of Quebec, which entered on a new period of growth and a more lively and many-sided participation of their members. Lastly, it spread to the other provinces of Canada, taking root among the farmers of Ontario and the Prairies."

Professor Fowke has mentioned the new flour mill at Saskatoon owned by the Saskatchewan Wheat Pool, but he neglected to mention that the merchandising and distribution of the flour, both export and domestic, is handled by another cooperative which is owned and operated by the regional cooperative wholesales in Canada, many of whom are engaged wholly in the distribution of farm supplies and consumer goods. This is a peculiar instance of producer cooperation and consumer cooperation meeting in mutual agreement. The farm housewife and the urban housewife in the Maritimes are using "Co-op" brand flour which reaches them cooperatively all the way from the fields to the baking oven. The cooperative which handles this flour—Interprovincial Co-operatives Limited—also owns and operates a bag factory in Montreal, which is another instance of cooperatives in the manufacturing field overlooked by this paper.

Answering Mr. Hedges' challenge, I would suggest that all cooperatives should insist in obtaining enough share capital to cover, dollar for dollar, their fixed assets. Mr. Hedges has pointed out that many cooperatives begin operations on what is at times literally a shoe-string, and hope that rising markets, generally favourable economic conditions, and loyal member patronage will enable them to retain in the business, from patronage refunds or from deductions for services, sufficient capital to allow them to retire borrowings from other sources. In many cases this has occurred, but member capital retained on this basis, and not specifically placed to share capital account, is not always too sound. The financing of expanded facilities should, in most instances, be done by capital provided by members in the form of shares, and not in the form of patronage refunds retained on a loan basis. Funds retained in this way are a direct liability of the association and are in the same category as a loan from a bank or other institution; they are, therefore, in the event of liquidation, of higher priority than capital in the form of shares.

Problems of financing cooperatives are of particular interest at this time because we have under way a project on this very problem in Canada. I have had an opportunity in recent months of discussing these problems with cooperative leaders from coast to coast, and one of the most contentious debates I have run across is the question of the payment of interest to members on patronage refunds retained in the business. There are those who say that inter-

est payments are merely another slice of the same melon and add only to operating costs, while others maintain that capital acquired from members through patronage refunds must be paid a rate of interest which should be looked upon as a wage to a prominent factor in production. The advocates of interest-free capital are as yet not too numerous, but the concept is becoming more widely understood and being urged in more annual meetings than ever before.

One can hardly discuss cooperative financing without mentioning the effect of corporation income tax on cooperatives; and while the issue in Canada has been settled temporarily, at least, I can see from the news I get from the United States that it is still a very live issue in that country. The main thing that concerns me is that in some cases cooperatives in both countries are allowing income tax regulations to influence their thinking in the matter of sound fiscal policy; as an example, I would like to refer to a certain cooperative in this country whose directors ordered a complete reversal of a former policy in order to take advantage of an apparent income tax saving. Upon examination a year later, it was discovered that the total saving had amounted to $70 and a conservative estimate of the cost to the association in administration as a result of the reversal of policy was well over this amount. The people who write income tax rules and regulations are concerned with raising revenue for the nation, and in most cases do not appreciate the problems some of these rules may create in the financial set-up and accounting procedure of a cooperative. I do not think they should be expected to understand; and unless, of course, the saving is a real one, I believe it to be a great mistake for cooperatives to allow income tax regulations to govern their methods of financing.

MARKETING RESEARCH

Chairman: W. F. Darke, Office of the High Commissioner for the United Kingdom, Ottawa

MARKETING RESEARCH IN THE UNITED STATES DURING THE PAST FIVE YEARS

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FIVE years ago we were emerging from a war, with agricultural production stepped up to levels far beyond the scale required to supply domestic needs. While home consumption had been restrained and a backlog of purchasing power had been accumulated, relatively little demand for agricultural products had been postponed compared with the demand for durable goods. Increased competition for the consumer's dollar was expected from an expanded industrial output as it was reconverted to consumer goods. Judging from the past, agricultural production was unlikely to contract as overseas demand for the products declined. Economists were predicting an agricultural slump by 1947.

These prospects loomed large in the minds of agricultural policy makers who were keenly aware of the aftermath of the preceding war. Their sights were turned to marketing with the thought expressed that research might contribute as much to expanding consumption of farm products as it had to increasing production. Such a possibility deserved exploration because it offered a better alternative than production control, the costs and limitations of which had become clearly apparent in the prewar experience.

New Legislation

Out of this situation came new legislation, the Research and Marketing Act of 1946, designed to bolster agricultural research in many respects. It contained a variety of objectives reflecting widespread interest in postwar problems of different kinds and a legislative advantage of bulking the varied research objectives into one bill. In the act at least two approaches to marketing problems were featured. One involved the expansion of utilization research intended to develop new and expanded uses. A separate and distinct appropriation was provided for this approach. The second was a less specific approach providing for research, service, and educational activities that could be conducted by a variety of agencies. The objective of the second approach, embodied in Title II of the Research and Marketing Act, also designated as the Agricultural Marketing Act of 1946, was directed more toward improvements that would be reflected in lower marketing costs and margins. High costs of

marketing farm products had been a matter of growing concern to Congressional leaders for several years prior to that time. Preliminary investigations convinced these leaders that the problems required research attention of considerable magnitude and scope.

When the Research and Marketing Act was enacted in 1946, the interest and thinking of research workers were stimulated because the act authorized large and rapidly expanding appropriations for the work. There was little opportunity for implementation of ideas at the time, because the new appropriations were to come later. The marketing research conducted by the Department of Agriculture and the State Agricultural Experiment Stations for many years was of limited scope, representing a very small part of the agricultural research program. Of the 24.75 million dollars expended for research in 1946 by the Department, 1.16 million, or 4.7 percent, was for marketing. This proportion, which is exclusive of utilization research, was probably typical for other agencies engaged in agricultural research.

Moreover, most expenditures for marketing in 1946 and before were devoted to service and regulatory activities. Market news, marketing agreements, inspection and grading programs, and health and sanitation and exchange regulations had been well established. A considerable share of the marketing research had been oriented about this type of work. During the war, marketing research generally was subordinated to the vastly expanded regulatory activities of that period.

Additional Funds

Investments in marketing research sufficient to promise results comparable with achievements in other types of agricultural research were begun only four years ago, when the first appropriation for the Research and Marketing Act was passed in 1947. They have been increased gradually since, and by 1951 the expenditures for marketing research by the Department of Agriculture were 5.59 million dollars, or 12.4 percent of a total research budget of 45.25 million. Over the past four years marketing research in the Department has increased nearly five times, while agricultural research generally has nearly doubled. Marketing research elsewhere, as in the State Agricultural Experiment Stations, has experienced similar growth, though probably at a less rapid rate.

In view of the limited prior experience with marketing research, the launching of the expanded program was tinged with a large element of hope that something worth-while could be accomplished. Organization and staffing problems occupied the administrative and research units alike during much of the first year. Despite the dearth of trained personnel and the uncertainty of funds that marked the outset of the undertaking,

it was started expeditiously. Over the next two years confidence in the potentialities of the program was increased, even though the appropriations fell far short of the authorizations upon which the planning had been predicated.

Accomplishments of agricultural marketing research do not lend themselves to ready measures in terms of added acres, bushels or tons of output, and they are still more difficult to translate into dollar estimates. Furthermore, tangible results are not easily segregated as accomplishments of research because of the close interrelationships with extension and service activities as our current program is being conducted. Nevertheless, an impressive array of work that is gaining favorable attention can be cited. A brief characterization of the activities can be obtained by citing a few examples from five general categories that are used for administrative purposes.

Basic Data and Information

Work on basic data and information is based on the proposition that effective marketing in a competitive system requires full knowledge on the part of buyers and sellers. It has led to improvement of market intelligence regarding supplies, stocks, movements, disappearances and prices of commodities in several different ways. This improvement comes from (1) filling important gaps in the statistics available to participants in the market; (2) increasing accuracy and adequacy of reports; and (3) introducing new services. Among the series being developed on a current basis to fill gaps are milk reports designed to estimate current consumption of fluid milk and cream, livestock slaughter and meat production reports, and vegetable seed production and stocks reports for some 250 kinds or varieties.

Improved accuracy and adequacy of previously established reports are illustrated by what has been done with statistical data for cattle on feed. Earlier cattle-on-feed reports were of such limited reliability that they were expressed only in terms of estimated percentage changes from the previous year. A more accurate report developed for four states gives actual numbers by ages and weights and probable time of sales, thus helping the market to anticipate supplies, manage stocks, and estimate prices with greater assurance.

New statistical services have been adapted to changed marketing practices. One example pertains to naval stores. Formerly the reports covered only quarterly estimates of production and stocks at points of production. Within the past 10 years this industry has been almost completely revolutionized, with central distillation plants placing it on a more efficient commercial basis. To facilitate and take advantage of these changes, the statistical services have been improved to provide monthly information

on production and stocks and quarterly statistics on consumption and stocks in industrial plants and distribution centers. The new services include estimates of: (1) monthly production of gum, turpentine, and resin; (2) average monthly prices for gum; (3) a weighted monthly price for gum, turpentine, and resin at Savannah, the principal terminal market; and (4) stocks on a location basis rather than in terms of ownership, the previous basis.

New services have been introduced to meet localized conditions. An example is found in the Benton Harbor peach market, where estimates are now being made of the dates on which the peaks of the peach marketings will occur. It is very important that the buyers and the appropriate market service people be notified and be on hand when the peaches are ripe and come to market, so that growers will have reasonable prospects of remunerative sales. But the harvest dates vary over a considerable range from year to year. In one recent year the peaches ripened so much earlier than usual that the peak of the early crop was past before market news reporters reached the market. Several weeks before harvest, estimates are now made of the time when the peaches will be ready. These orchard surveys are remarkably accurate, rarely missing by more than a day, and this only when inclement weather disrupts harvesting. Both buyers and growers are now on hand at the time to trade with each other and handle the crop efficiently.

Different types of market news services have also been tried. An example is the experimental retail market news service conducted in Baltimore last year. It supplied surprisingly useful information regarding the small size of sample that can be drawn to supply reliable price data, the cost of conducting the service, the speed of assembling the data, and the trade acceptance of the service. It proved to be a highly useful source of data for research analyses on price margins as well as on the potential effectiveness of such a service on price responses by retailers to changes in wholesale prices.

Expanding Outlets for Farm Products

Farm products markets can be expanded by methods other than those devised in utilization research or directed toward reductions in costs and prices. Learning more about what buyers want is an example, and a whole array of studies on consumption patterns, consumers' buying habits, and consumer preferences have been introduced to help guide suppliers in satisfying the wants. Such work has been popular among trade groups because it helps them to identify and emphasize the features of their products that appeal to consumers. The work is applicable at the farm, too, as is illustrated by exploratory work on markets and prices for farm forest products to familiarize farmers with available

outlets, possible grades, and alternative methods for selling farm timber.

The counterpart of learning more about wants is consumer education designed to acquaint housewives with the uses, merits, and methods of preparing products. It is too much to expect the modern housewife to be an intelligent buyer of the literally hundreds of items available for her selection at the self service counters of a supermarket. While this type of work was conceived and developed in periods of surplus, the same agencies, organizations, and people are proving their worth in periods of shortage by calling attention to available alternative products, by discouraging hoarding and other evidences of wasteful, irrational buying, and by helping consumers make their dollars go farther to satisfy family nutritional and shelter requirements.

Another interesting activity included in this type of work is the establishment of procedures to identify and protect stocks of improved varieties of seed until adequate qualities can be produced to supply demand. In the past, many of these highly desirable products of the plant breeder never attained general use because stock were dissipated in marketing channels before they were adequately developed.

Marketing Costs, Margins, and Services

Virtually all marketing research can be rationalized as contributing toward lower costs and margins. Some studies need to deal more directly with the subject, for example, to measure costs and their relationships to margins and services performed.

Two distinct analytical approaches have been followed. One involves the comparison of cost experiences of different firms or plants performing essentially the same functions. Studies of this kind enable business managers to appraise their operations in the light of what others are doing and to locate spots where inefficiencies exist. Recent publications from this work covering grain dealers, mixed feed plants, and cooperative cotton gins indicate wide ranges in costs. Operating costs of feed mills, for example, were found to range from $3.00 to more than $13.00 a ton; the same study showed that operating costs of retail feed stores ranged from 58 cents to nearly $9.50 a ton. The reports explore the factors accounting for these wide differences and provide leads for market operators to follow in reducing them.

The second approach involves detailed studies of services performed and costs incurred in moving selected products from farms through marketing channels. Illustrative of this type of work is a recent study of Delicious apples grown in Washington State and sold in Chicago. It showed that the producer got 26 cents of the consumer's dollar spent for these apples, while 24 cents went for washing, grading, packing, cold storage, and other packing plant services; 14 cents for transportation

from the local packing plant to Chicago; and 36 cents for wholesaling and retailing. In the analysis of what contributed to these costs, research workers have uncovered very productive leads for applied research. A substantial share of wholesaling and retailing cost could be attributed to losses in waste and spoilage. Much of this could be avoided by eliminating bruising in packing house operations. Follow-up work of this sort is being arranged and is paying dividends in reduced costs, as well as more satisfactory merchandise.

Improvements in Handling Farm Products

Research and service designed to improve the physical handling of farm products represent a direct and tangible approach to reducing marketing costs. A number of applications are being pursued but time is available to mention only a few.

Costs of trading are less when transactions can be based upon reliable grades, so that buyers do not have to incur the expense of actual inspection and can avoid the risks of not getting what they expect. For grades to be satisfactory today, however, they have to be much more specific and accurate to indicate values of products in our present complex processing and distributing systems. Simply to measure the weight and moisture content or the cracked or damaged kernels of grains is not enough today, because flour makers and oil mill operators need to know in addition about such factors as protein content and baking qualities, or the amount, kind, and condition of the oil content of the seeds. Improved standards for grades are being developed to meet better the needs of the trade and facilitate exchange. Also cheaper and handier ways of measuring these values are being developed so that inspectors or buyers can establish relative values quickly without necessity for lengthy, expensive laboratory tests. An excellent illustration of this work can be cited in the case of hog carcass weight and grade studies developed in the State Experiment Stations which are having far-reaching effects in improving market evaluation and trading practices.

Transportation costs are subject to considerable reduction by methods other than rate reductions. By remodeling shipping crates for lettuce and other vegetables, research workers have demonstrated substantially reduced intransit damage and at the same time a reduced need for refrigerator cars by one in 16. The results have led to the adoption of the new crate by California and Arizona shippers; and the practice is spreading to other states.

Cost reduction as such is only one benefit from this type of research. Equally as important today is the conservation of food. Investigation of time and temperature requirements for efficient, effective grain drying is already resulting in more food actually reaching consumers. Such conser-

vation is reflected also in higher quality and more nutritious products. Conservation from this research also occurs in the use of critical materials. Storage investigations have led to more efficient use of warehouses and refrigerator cars, and have avoided investments in new structures and equipment of dubious value for preserving the quality of products.

Evaluation and Improvement of the Marketing System

Within the next two months, new wholesale produce markets will be opened in San Antonio, Texas, and Columbia, South Carolina. Markets are under construction in Hartford, Connecticut, and St. Louis, Missouri. These represent evidence of a whole series of long-advocated, major market improvements that are now appearing under the stimulation of the expanded research and service work of the past four years.

Mechanically refrigerated railroad cars have now been successfully introduced to replace the old ice bunkers, with one company having 66 cars in service and 99 additional cars under construction. This development, together with comparable improvements in truck refrigeration equipment, has been facilitated by the program, and will contribute greatly to the sound development of the frozen food industry.

More efficient use of existing market facilities is being emphasized currently in recognition of shortages of construction materials. It seeks better utilization of available labor as well as reductions in wholesaling and retailing costs. The new check-out system designed for retail stores, for example, will save 40 percent in time and labor required for this function. Originating with the new research program, with the first results appearing less than two years ago, there are now more than 1,000 of these check-out counters in use. Comparable savings are being demonstrated for other retail store functions, such as receiving and unloading case goods, price marking, and shelving and displaying products. These new procedures which have been developed, installed, and tested experimentally in stores, have shown labor savings ranging from 35 to 45 percent.

New research results are being rapidly translated into adopted commercial practices through the efforts of contractors, State Extension Services, and State Departments of Agriculture. A survey of the results of one contract program to improve retailing of fruits and vegetables indicates that 95 percent of the retailers given the information and training have increased sales and reduced spoilage losses. Over 45 percent remodeled their produce departments and some of them remodeled their entire stores. One technical assistance program conducted by the North Carolina State Department of Agriculture has reduced the percentage of rough ginned cotton from 19.8 percent to less than five percent. In a

similar way, the Wisconsin State Department of Agriculture was able to increase the percentage of "State brand" top quality cheese produced in one county from 23 percent to 58 percent.

Some General Reactions

Estimates of the value of results are reflected by the reactions of advisory committees. These reactions are not always favorable on specific projects, but the general consensus is that the marketing research warrants further support and expansion. We have recently had the satisfaction of tracing the progress of one project to the Agricultural Research Policy Committee and hearing the group pass the judgment that this project alone would pay for all the appropriations made for the Agricultural Marketing Act thus far.

Some activities are also receiving the acclaim of business groups. The National Wholesale Frozen Food Distributors Association presented its 1951 Distinguished Merit Award to the Production and Marketing Administration, citing three activities conducted under the new marketing program as the basis for the award. It marked the first time this award has been given to a governmental agency.

More concrete evidence of the favorable reception of recent marketing research is found in the willingness with which business firms are opening their establishments to research workers. Marketing research cannot be conducted in isolated laboratories. It depends upon studies conducted during the daily operations of business and industry. Our laboratories are the commercial establishments themselves. Our opportunities depend upon the accessibility of these laboratories to us. It is significant that we are gaining the confidence of business men to the point that we are getting urgent requests from some firms to conduct research in their establishments. This is particularly significant in the case of warehouses and retail stores, which represent areas where agricultural marketing research workers have had the least experience in the past.

Critical Appraisal

Even though evidences of favorable reception of our research can be cited, appropriations for this work are now being reduced. Explanations that have been given for this anomalous situation are varied and include: (1) The program of marketing research is not being conducted efficiently and just as much can be achieved with less funds; (2) conditions have turned out to be vastly different from what was expected five years ago, so the need for the work is not so great as anticipated; (3) the need for economy is so great that even essential research must be curtailed; and (4) too good a job has been done in focusing attention on limitations

of the marketing system, so opponents have arisen to offset the proponents of the work. Though the last reason might be regarded as complimentary, it is the most difficult to substantiate.

Regardless of which of the many explanations offered are affecting the appropriations, the situation calls for some critical self-appraisal. A list of criticisms quite as long as the accomplishments could be compiled, but again it must be confined to a few examples. They might be classified as criticisms of the research, of the research workers, and of the research administration, even though the classification is admittedly arbitrary and the parts are not mutually exclusive.

Criticism of Research. A frequent criticism of the research is that few original ideas have evolved from the program. Instead, ideas developed in other sciences and industries have been adapted to agricultural marketing problems. This situation might be expected in the light of the limited experience cited earlier. More significant, however, is the relevant point that there are too many misapplications of theories, methods, and tools borrowed from other disciplines. Examples include attempts at controlled experiments with inadequate control of the related factors, and persons with only a partial understanding of work simplification techniques endeavoring to use motion and time studies where they don't apply.

The question is repeatedly raised whether there are not too many ill-conceived, repetitious surveys. This question comes especially from large business institutions that route requests from many different research organizations to a central office. One suggested solution, that all such requests be cleared by a central statistical control agency before they go out, has been shown to have its drawbacks. Another criticism suggests that too much of the work is still on a batch production basis and should be converted to continuous processes. For example, case studies of costs and margins are based on expensive, one-time surveys; the results are out of date before they are analyzed and published. We might instead use current series of detailed costs assembled by specialized collection agencies to detect places where cost and margin changes occur while there is still time to do something about them.

Marketing research is accused of failure to treat the larger, more substantial problems of the day. For example, none of the research was directed at the core of problems involved with recent large potato surpluses. Only small, fringe aspects were tackled. This same type of criticism is expressed another way when it is said that model analyses have been successfully applied to many small problems, but not to the marketing system as a whole or to any large segments of it. As a result, we may be improving the operations of a job when the job itself should be eliminated.

This latter point is closely associated with the proposition that one cannot discern advances in the fundamental theory of marketing. Some attention has been devoted to the planning of proposed projects intended to make such contributions, but there has been a distinct reluctance to undertake the projects. This is in contrast with some marketing research being done in nonagricultural fields, and it may reflect the fact that there has been little disposition on the part of policy makers, legislators, or research workers to think in terms of revolutionizing our agricultural marketing system. Most of us feel that we have a pretty good one, serving this country well by making the products of agriculture available in every town in every season of the year in a wide variety of acceptable forms and qualities.

It has been charged that too much of our work has been devoted to descriptive research in the hope that it will provide the basis for more useful work later. Changes in marketing have been occurring at a rapid pace with new industries, viz., frozen food; new methods, viz., prepackaged, self-service meats; and new systems of distribution, viz., supermarkets, developing rapidly the past five years. They have not been led by marketing research. Instead, the marketing research has hardly kept up with describing the changes, let alone weighing their significance or analyzing their consequences.

Criticisms of Research Workers. Aside from complaints about an insufficiency of well trained research workers, and about the program being instrumental in raising the costs of good ones, several criticisms deserving more serious consideration are voiced. One is that too many research workers persist in trying to do their marketing research on farms or in confining their attention to problems at first assembly points, when most of the marketing costs are absorbed in marketing functions farther removed from the farms. With all due recognition that marketing starts at the farm, that agricultural research experience is greatest at that end of the line, and that a comprehensive investigation must start at that point, it is still difficult to defend projects using marketing research funds mostly on field growing trials, animal feeding experiments, pre-harvest insect controls, or harvesting methods.

Another criticism states that although most of the accomplishments in marketing research combine the contributions of scientists in such various fields as economics, statistics, engineering, industrial management, biology or chemistry, many workers are unwilling to engage voluntarily in joint projects of an integrated nature. The same criticism is made of workers with similar training from different institutions, agencies, or units, even though the Research and Marketing Act provides conditions more conducive to such joint efforts than any previous legislation has done. Part

of the difficulty may be attributed to supervisors who insist that other types of assignments of more immediate concern to them receive foremost attention, but this is not a completely satisfactory explanation of why more teamwork is not in evidence, or why so much time at joint meetings is occupied with division of funds rather than with coordination of research.

Another point is that research workers haven't integrated the contributions different approaches make to analyses of similar subjects or problems. For example, statistical demand studies, consumer income and expenditure surveys, and consumer preference investigations all appear to have a bearing on elasticity of demand, but little has been done to see how one supplements another or provides a better insight into the answers sought.

Criticism of Administration. Fully as much criticism has been leveled at the organization and administration of the marketing research as at the work or the workers. To start with, it is charged that an adequate definition of marketing has not been developed or accepted, and as a consequence not enough clear-cut policies have been promulgated to guide the program effectively. Moreover, the funds are divided among many small, inadequately supported projects that never get finished. In part, this reflects efforts to respond to recommendations of a number of advisory committees and to permit the participation of a number of agencies in the program; it also is a consequence of planning for larger appropriations than actually have materialized.

Some critics have said there is a lack of evidence of an over-all balanced program. There is no master plan—which isn't hard to explain—but even within commodity or functional areas there has been inadequate consideration of comprehensively planned programs—which is more difficult to defend. Closely related is the criticism that insufficient service has been provided for advisory committees or for research conferences where such planning and appraisal functions might be expedited.

It has also been charged that this new work has been largely fitted into older established patterns of administration that were set up to handle other types of programs, and are too inflexible to handle the different work and management involved in this program. Consequently, there have been definite handicaps to the arrangement of coordinated activities and new activities contemplated for marketing. Certainly, the willingness of research workers to participate in joint projects is conditioned by the administrative management.

Perhaps the most insistent criticism has been that marketing research needs to be consolidated in specialized agency or organizational units if it is to get properly qualified management and direction. This has been

a matter of controversy since the inception of the Research and Marketing Act and has continued to be a subject for divided opinions among groups studying the situation.

Conclusion

If agricultural marketing research is judged in terms of goals set out for it five years ago, it has fallen far short of the mark. This is attributable more to the fact that the conditions it was intended to alleviate did not materialize as expected, than it is to a lack of fruitfulness of the research. Had the conditions materialized, the work probably would have been too little, too late, and too poorly conceived.

With all the shortcomings, most of which can easily be overemphasized, the program has returned a full measure of value for every research dollar spent, has been directed at problems long in need of attention, and has proved flexible in meeting current problems as they arise, come shortages or surpluses. None of the ground has been completely tilled and most of it remains to be plowed. The implements need considerable improvement, and the help as well as the management needs additional experience and training. But an excellent start has been made toward overcoming these deficiencies. In fact, the improved marketing curricula of the colleges, the marketing research workshops, the expanded literature on the subject, and the better arrangements for exchange of research information can well be cited as examples of additional benefits from the program that promise results over a longer period of time.

Looking toward the future, one cannot help feeling that the conditions expected when the expansion of marketing work was being advocated five years ago have not been eliminated. They have only been postponed. Pleas for more agricultural production have been heard again. Farmers are responding and they have the resources and price incentives to permit a good response. But the major demand-stimulating force at work today will recede in time, while increased farm production will likely continue. Marketing costs and margins are on the rise again, and they, too, will tend to remain high. With these potentialities ahead, the point needs to be emphasized that continuity of effort is needed in marketing research quite as much as in physical or biological research.

The training of research personnel, the flow of ideas, and the productiveness of projects cannot be turned off and on again successfully. Every interlude is followed by an expensive, time-consuming build-up before lost impetus can be regained. We cannot afford to wait until the problems are upon us again before we start research to solve them.

RESEARCH IN MARKETING EFFICIENCY

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The General Approach to Improved Efficiency

THE basic objective of research in marketing efficiency is, of course, to devise ways by which the efficiency of marketing can be increased and the costs between producer and consumer reduced. In more specific form, the objective is to describe in operational terms the determinants of efficiency and costs, and to indicate how these may be manipulated and changed in order to improve efficiency and reduce costs. Two aspects of this statement of objectives are especially important to research workers: "operational terms" and "change." By its very nature, improved efficiency involves changes and adjustments, and our research must be designed to determine how the various aspects of the marketing system operate and how new and different organizations would influence efficiency and costs.

It is quite clear that changes are not made in a general and abstract sense, but that they require specific modification to definite parts in the system. Thus, we do not improve the efficiency of the marketing system directly, but through changes in the operation and integration of various marketing facilities such as plants, trucking systems, warehouses, and terminal markets. Again, plant efficiency must be approached from the standpoint of the operations and capital goods that constitute the plant. This leads us to an obvious but important generalization about marketing: at every level the marketing functions in question consist of the combination and integration of a number of elements, and improving the efficiency of the functions always consists of a reordering and reintegrating of these elements.

This concept of market organization involves a chain or sequence in which every part can be broken down into elements or, vice versa, elements aggregated to represent higher and higher stages in the marketing process. We may elect to start with nerve and muscle responses, for example, and build these into motion elements such as reaching or grasping. Motion elements may be combined into job elements such as turning and transporting, and these into descriptions of jobs such as unloading and trucking. The combination and integration of jobs will constitute an operation—receiving fruit at a plant, for example—and so we build up through departments or enterprises to plants and eventually to complex marketing systems or even the entire economy. In short, from any point in the marketing system we have an interdependent and interrelated organiza-

tion extending down to the most detailed and basic elements and expanding up to the broadest aggregates in the economy.

This does not mean that effective research must encompass this entire range—even to attempt such a task would be to insure certain defeat. Research is a process of simplification by which we focus attention on certain aspects of a problem and reduce our task to manageable proportions by taking certain things as given. In any particular study, then, we will arbitrarily define some things as basic elements and not attempt to explain the component relationships underlying these "basic" elements. This arbitrary level will depend on the particular objectives of the research project and on the interests of the research worker, and different studies will and should select quite different levels at which to operate. While the particular research approaches that are appropriate will vary widely at alternative levels, at each the conceptual framework will be essentially comparable—the combination and integration of a number of elements into a structural or operational description of the whole. And at each level the basic research jobs are similar: (1) to identify and describe the elements in operational terms; (2) to describe the interconnections among these elements; and (3) to indicate the effects of changes in operation and integration on efficiency and costs.

Examples Drawn from Dairy Marketing Research

Suppose we attempt to make some of these general ideas clear by reference to specific examples drawn from current research in dairy marketing. These illustrations are not intended as a systematic and exhaustive review of all of the work available in this field, but rather as a limited selection to stress the general comparability of approach at widely different levels in the marketing system.

1. *The Efficiency of the Pricing Mechanism for Manufactured Dairy Products.* As part of the Western Regional Dairy Marketing Research Project, James Hassler of California is making a study of the operation of the manufactured dairy products market as a price-making mechanism. This study does not inquire into such aspects as the efficiency of plant and transportation operations or the appropriateness of existing rate and allowance structures. Rather, these are taken as basic elements and considered in a framework of intermarket, interproduct, and intertemporal relationships. The approach seems appropriate to give (approximate) answers to such questions as the effectiveness or efficiency of the market system in establishing internally consistent prices; in directing product supplies to markets where, when, and in the quantities demanded; in allocating available supplies of milk among the alternative product uses; and in reflecting product values in the prices paid to farmers.

2. *Studies of Dairy Manufacturing Plants.* Again as part of the West-

ern Regional Project, Gordon Rowe, Glenn Nelson, Scott Walker, and Homer Preston have been cooperating on a series of studies of manufacturing plants in the Pacific Northwest. Here the emphasis is on determining short- and long-run plant cost curves. Basic elements are operations and jobs within the plant, with little attempt *at this stage* to improve the efficiency of these elements other than through interplant comparisons for particular categories or inputs and costs. These studies seem appropriate to give (approximate) answers to such questions as the effects on plant costs of loss of milk supplies through diversion to fluid uses; the effects of seasonal variation in supplies; and the effects of excess capacity and scale of operation on plant costs.

3. *Studies of Procurement and Transportation.* More or less paralleling the above plant studies, the Western Regional Project has scheduled a study of procurement, transportation, and related factors external to plant operations. While the immediate objectives of this study will be in terms of increasing efficiency in the functions specified, major interest in the work stems from the desire to combine plant and transportation studies into syntheses of optimum organizations for multiple-plant firms and for the market system of geographic areas.

4. *Studies of Operations Within Plants.* The study that French and Wood of Purdue have been making of milk receiving operations is a good example of research aimed at improving efficiency of a particular operation within plants. While I am only generally familiar with this project, I expect that industrial engineering and economic techniques are being utilized, and that basic elements are at least in some instances elements of motion. Such a study would seem appropriate to indicate the (approximate) effects of work methods, layout, and labor-equipment combinations on costs and efficiency of the receiving operation.

I would like to make several points with reference to this abbreviated list of projects. First, I want to re-emphasize that, although concerned with widely differing levels in the market, each study consists basically of descriptions of the operation and integration of a number of elements, and of the effects of changes in organization on efficiency. Second, each represents in itself a valuable research contribution. Finally, the total of a series of such studies has greater value than the sum of its independent components, for each can contribute to the successive refinement of those that follow. You will recall our previous reference to the need for simplification in research in order to reduce any particular project to manageable proportions. There is also the need for coordination of these partial studies and for their eventual integration into synthetic studies of major sectors of the marketing system. In the examples above, it is obvious that studies of internal plant operations can be used to improve studies of

economies of scale; that plant and transportation studies can be combined to improve the local organization of marketing facilities; and that all of these studies can contribute to the refinement and improvement of studies of the market as a pricing mechanism. It is clear that we cannot delay such studies until we have perfect knowledge of all underlying elements—if we did we would be forced to abandon research completely. It is just as clear that effective progress in our marketing research requires that component studies be in a form that will contribute to improved knowledge, and that they be brought together periodically in syntheses with broader scope than any of the components.

The Status of Research in Marketing Efficiency

While it might be difficult to prove, I have the definite feeling that the past decade has seen a significant improvement in our marketing research. Part of this no doubt represents a natural evolution and building on previous work. The stress on improved efficiency, especially by the Research and Marketing Act, has led to an expansion of work beyond introductory and descriptive phases and into operational aspects of marketing facilities. We are developing a better set of tools in theory, accounting, statistical analysis, and synthesis, and we are learning to combine these with techniques borrowed from other fields.

Perhaps the most important factor in improved marketing research has been the adoption and application of industrial engineering techniques, both by agricultural economists and by active participation by industrial engineers. The emphasis of this type of research is not on "What is it?" but on "How does it work?" and "How can we change and improve it?" I suspect that this has been one of the most rapidly expanding fields in agricultural marketing research. The projects at Cornell and Purdue are good examples, as is the work under way on materials handling by the Marketing Facilities Branch of PMA. The Industrial Engineering group at California has made studies of several harvesting and marketing operations, and several members of the staff have worked on the California-Bureau of Agricultural Economics studies of fruit packing houses. Many other examples could be cited, including an increasing number of agricultural marketing and processing firms that are adding industrial engineers to their management staffs.

While the direct results of studies of this type are quite significant and sometimes spectacular, I doubt if they represent the major contribution of such techniques to our marketing research. I consider their primary contributions to be: (1) emphasizing the advantages of interdiscipline cooperation, and so encouraging such cooperation with fields extending far beyond industrial engineering; and (2) emphasizing the study of elements

in operational terms, and the synthesis of these elements into new and different organizations—again with implications that go far beyond industrial engineering.

I do not mean to imply that our marketing efficiency research is without fault. We still have many studies that terminate without breaking through the purely descriptive phases. Even where this is not true, the results frequently leave much to be desired in terms of usefulness. Too many items in our "search of the literature" yield only titles, and too few contribute essential information in forms well designed to contribute to succeeding studies. Too many of our studies are cast in historical and local terms that do not permit modification for use in other localities or in the given locality at later dates. But in spite of this, we have had a gratifying growth of studies of cotton gins, oil mills, dairy plants, meat packing plants, fruit and vegetable packing houses, poultry dressing plants, trucking and delivery operations, and so on, that is based on better concepts of the problem of improving marketing efficiency and on improved research tools.

Some Specific Problems

I have already indicated that I believe the greatest limitation in our past work has been the failure to develop our studies along analytical and operational lines that will permit an appraisal of the effects of changes in organization on marketing efficiency, and that the recent expansion along these lines has meant a real improvement in the quality of our marketing research. I would now like to turn to a few specific problems that are commonly encountered in marketing efficiency studies. I should add that most of these are drawn from our experiences at California, but that a brief review of the literature suggests their general importance. In some of these we believe that we have or are developing satisfactory answers; in others neither theoretical nor empirical tools seem adequate. And in some cases it seems probable that really satisfactory answers are impossible.

To begin with, I would like to refer to an analysis of the relation between volume and labor requirements in dumping fruit in a pear packing house. Preliminary review of the data indicated a close relation between daily hours of dumping labor and daily volume, and this was confirmed by subsequent statistical analysis: the regression equation was $H = 2.63 + 0.054V$, where H represents daily hours of labor and V the daily volume in thousand pounds (see Figure 1); the corrected coefficient of correlation was 0.928. Such results might appear to be most satisfactory to the researcher. The regression is quite definite and highly significant in a statistical sense. And in addition, the results serve to further discredit that old timer—the law of diminishing returns.

I am sure that many of you realize that these apparently gratifying

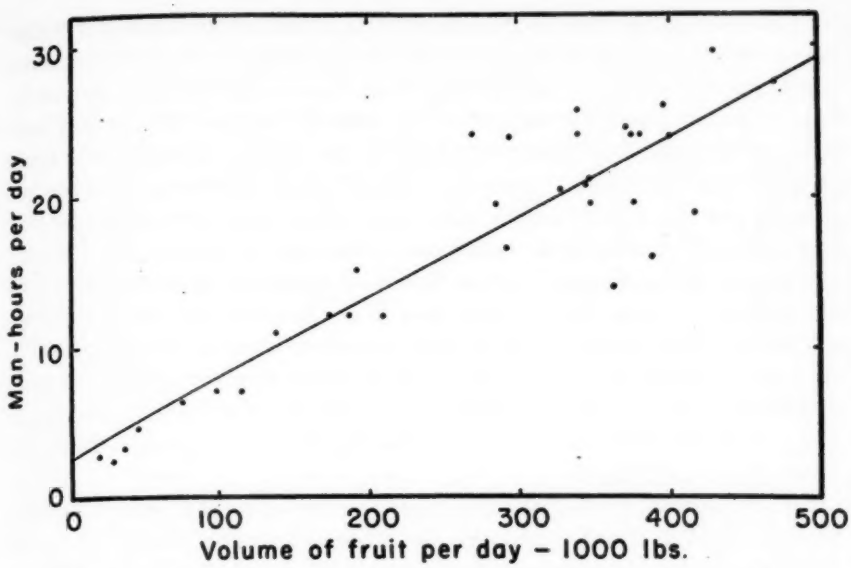

FIG. 1.—Apparent regression between volume and labor requirements, dumping fruit in pear packing house.

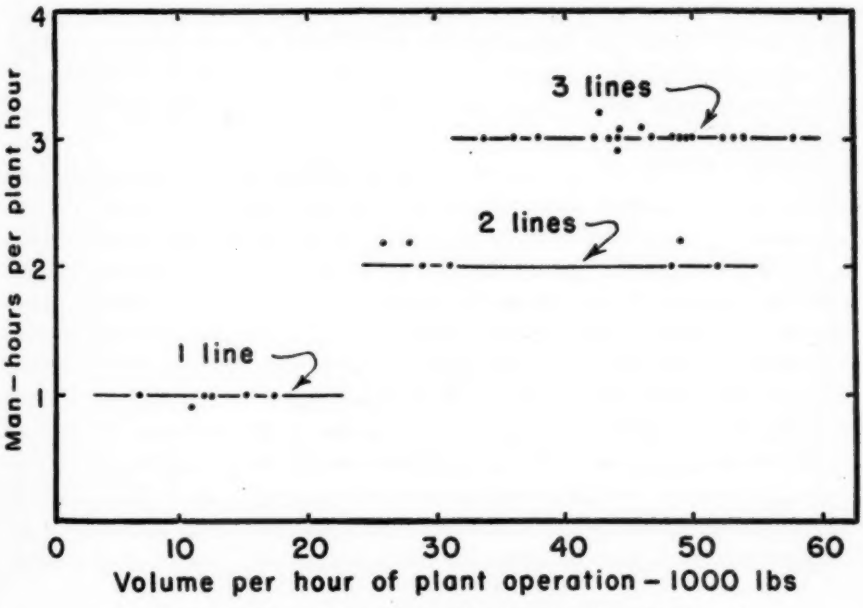

FIG. 2.—True volume-labor relationship for pear dumping, based volume and labor *per plant hour.*

results are of little value as a description of actual organization and operation in this plant, and that the use of this equation to plan reorganizations would probably be most misleading. From this standpoint the high correlation is spurious, since it reflects almost entirely the multiplication of both independent and dependent variables by the highly variable daily hours of plant (or plant line) operation. Actual plant operation involves one dumper per line and, at least within very broad limits, this crew organization is not affected by wide variations in the *rate* of output. This situation is revealed in the Figure 2, where hours of dumping labor *per plant hour* are related to volume of fruit *per plant hour*. The one man per line characteristic of the operation is clearly revealed—a characteristic obvious enough in this simple case. Further study based on time and motion techniques can and have been used to allocate the dumper's time between idle and productive work, and to define the approximate capacity of the man under these conditions.

As mentioned above, this all seems quite obvious. Yet I suspect that this type of problem is involved in almost all of our studies. The most readily available basic data are usually in terms of daily, weekly, monthly, or annual totals, and we commonly have used these in our analyses. The results are of some value if used correctly, but they are quite misleading if used as a description of plant organization, They have little bearing on the problem of diminishing returns (which may or may not be important) since they do not reflect the intensification factor that is basic to this law. They merely prove, to use a simple example, that it takes about twice as much gasoline to drive your car for two hours as it does to drive for one hour–other things remaining equal!

I would like to cite a second problem encountered in commonly used statistical approaches. Suppose we consider the problem of total labor requirements in a plant, and conceive it to be a function of several volume variables, such as the amount of fruit received, the volume of fruit packed, and the volume of culls.[1] Note that in this and the previous example I have inverted the usual input-output direction—inputs of labor are expressed as functions of the output of fruit, since in large measure the volume flow is subject only to limited control, and the plant adjustments take the form of adjustments of inputs in response to changes in the volume received. A quite common approach to this problem would be to analyze total labor requirements by multiple correlation methods, using the several volume categories as independent variables. The results of such an analysis are summarized in Figure 3—again for the operation of a pear packing house.

[1] This example is taken from "New Techniques in Plant Efficiency Research" by B. C. French, a paper presented at the Western Farm Economics Association meeting, July, 1951.

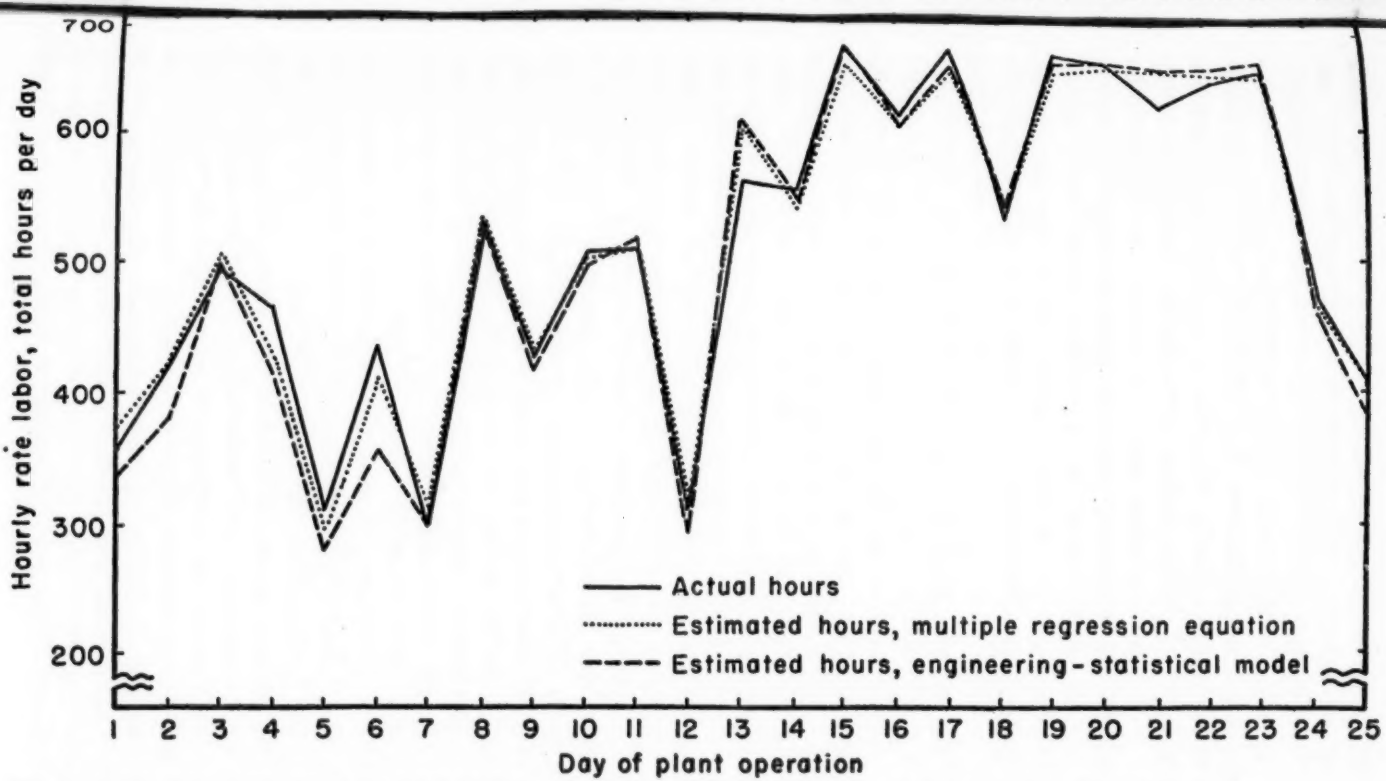
Hourly rate labor, total hours per day
700
600
500
400
300
200
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Day of plant operation
Actual hours
Estimated hours, multiple regression equation
Estimated hours, engineering-statistical model

FIG. 3.—Comparison of actual and estimated total daily hours of hourly-rate labor for a California pear packing plant, 1949

Multiple regression equation: $Y = 81.22 + 0.288X_1 + 0.527X_2 - 0.631X_3 + 51.05X_4$

Engineering-statistical equation: $Y = 0.808X_1 + 0.300X_2 + 0.300X_3 + \begin{cases} 46.00 + 40.66X_4 & R_p < 14{,}000 \\ 47.75 + 44.16X_4 & X_p > 14{,}000 \end{cases}$

where Y represents the total daily hours of hourly rate labor, X_1 the volume of packed fruit in thousand pounds per day, X_2 the volume of cannery fruit, X_3 the volume of cull fruit, X_4 the daily hours of plant operation, and R_p the rate of output of packed fruit in thousand pounds per hour. Note that the engineering-statistical equation was developed through rate analyses similar to that shown in Figure 2, and then converted to a daily equation by multiplying by the hours of plant operation.

This diagram shows the actual day-to-day changes in total hourly labor and the estimates based on the multiple regression analysis. While estimates depart somewhat from the actuals, the correspondence is extremely close. The corrected coefficient of multiple correlation is 0.987.

Again, this would appear to be a most satisfactory solution and to suggest that the regression equation should be a dependable description of plant operations. The several volume variables are highly interrelated, however, and this intercorrelation results in unstable and undependable regression coefficients. It is not my present purpose to enlarge on this problem of intercorrelation, but simply to raise it as a warning to students of marketing efficiency. In this particular instance, we were most interested in describing labor-volume relations for a number of jobs and elements within the plant. In most cases it was possible to avoid the problem of intercorrelation in these elements, since the particular job was logically related to a single volume category. Thus, the receiving labor is related to the total volume received, the dumping labor to the volume run through the plant, the lidding and loading labor to the volume of packed fruit, and so on. We then aggregated the several equations in order to synthesize an equation for all hourly labor. These results are also included in Figure 3. While the correspondence between actual hours and estimates based on the synthetic equation is not quite as close as in the previous case (the multiple correlation technique, of course, will yield the highest possible correlation coefficient for an equation of any given form), the correspondence is still quite high. The correlation between actual and estimates, corrected for loss of degrees of freedom, is 0.973. More important, the nature of the analysis insures a more dependable set of regression coefficients and so provides a good description of the actual operation of the plant. Finally, it re-emphasizes the desirability of breaking the function under study into component elements. Note that it also provides us with the subequations, and that these contain much more valuable information than the aggregated multiple equation.

I want to make brief mention of some problems associated with long-run costs and the evaluation of the costs associated with durable capital goods. These problems are important especially in that they involve us in the uncertain developments of the future. Yet, future periods are those with which we must be concerned—our studies of the past are valuable only as they provide information on which to base decisions in the present and future. Several related aspects of these problems may be mentioned. First, consider the simple case of determining appropriate cost allowances for buildings and equipment. The problem arises because these inputs are not completely used in any production period. Moreover, we have not been very successful in developing functional relationships between such

items as depreciation and factors such as time, period of use, intensity of use, and maintenance expenses. Finally, technological advance continually raises problems of obsolescence. It is possible that some of these deficiencies can be reduced through careful study, but many will always remain as a considerable area of uncertainty.

Under these conditions, we may avoid the problem in some cases where the pertinent facts for decision making do not involve these fixed costs. In other areas, however, the appraisal of such costs is essential to the study. This is certainly true of economies of scale, since here the emphasis is on the relative efficiency and costs of plants that differ in scale and investment. It is also true in terms of labor saving devices. The most important factor substitution possibilities in many marketing situations exist between labor on one hand, and equipment and mechanical power on the other. And this requires a description of the physical inputs—this equipment associated with these amounts of labor—coupled with estimates of present and future prices for these factors. Two adjustments seem appropriate, although neither is completely satisfactory. First, we should clearly indicate the arbitrary nature of some of our computations, so that the reader may make such adjustments as he thinks warranted—and especially so he will be warned as to this limitation to our results. Second, we can indicate the importance of these arbitrary elements by carrying through our calculations at several levels of prices and costs. A logical extension of this is the development of relationships based on expectation distributions, although here again the past may be a poor indicator of future expectations.

The area of uncertainty stresses the need for work on flexible organizations that can adjust to changing conditions. In our emphasis on reducing costs, we may indicate a preference for organizations that give the lowest cost under existing conditions but that would be subject to rapidly increasing costs under changed conditions. An obvious example is mechanization, where low cost at present is obtained at the expense of flexibility—remember that labor is a variable cost, and that we can adjust to changes in such things as plant volume by hiring more or less laborers. Another example is in plant specialization. At any point in time it will be less expensive to operate a plant equipped to produce only cheese than it would if the plant also had stand-by capacity to produce butter and powder. Yet over a period of years, the flexibility in diverting milk supplies from one product to another may more than offset the added costs in terms of increased returns. Again, this requires an appraisal in terms of expectation frequencies.

Let me close by using the above illustrations as a warning against the temptation to appear overdefinite in our research findings. All of us want our results to be clear and simple, and probably to be so strong that they appear as irresistible recommendations to the industry. It is indeed the

function of research to provide information on which entrepreneurs can base their decisions, and we should try to make this information as good and as complete as possible. But the research function and the entrepreneurial function differ, and research can never take over the risk-bearing functions of management that are an essential part of the uncertain future. We can supply a plant manager with information about the labor saving potentials of a particular machine, with estimates of the savings in costs *under stated conditions*, and even with some useful information about future expectations. But then our function ends, and to go beyond is to weaken the entire value of the research contribution.

DISCUSSION

JOHN W. WHITE
University of Arkansas

First, I would like to make several direct comments regarding Mr. Trelogan's paper. In some sections of the paper I was somewhat at a loss to determine when Mr. Trelogan was referring to marketing research and when to marketing service and regulatory activities. This leads to the observation that the Research and Marketing Act is in itself a confusion from the standpoint of separating the three functions referred to above. My personal observation is that the research accomplishments and shortcomings of the past five years are clouded by the lumping under the heading of marketing research of about all the work that pertains to marketing, including research, service, and regulatory activities. The issue is further obscured by the concept of people generally that everyone sharing in R.M.A. funds is engaged in marketing research. Obviously, such is not the case. Many people are apt to be more or less critical of activities carried on under the act masquerading as research, but actually pertaining to some other function. A more specific spelling out of the purposes of the act would eliminate some of the misconceptions now prevailing.

In the second instance, I would have preferred that Mr. Trelogan discuss at greater length the functions of lay or industry advisory committees. That is, have these committees really functioned, or have they been rubber stamps for programs of research which certain individuals wished to promote? Have they really taken a constructive viewpoint, or have they taken the position that economic efficiency in most segments of marketing is all right—that the other fellow should try to improve his methods? Also, how have the advisory committees functioned from the standpoint of research in the state institutions? From my standpoint, I have not been in position to determine the extent to which the advisory committees have been a factor in the programs of state research.

A third point which Mr. Trelogan might have discussed at greater length in his paper has to do with an evaluation of regional research. I would particularly like to know if regional research is an effective means of accomplishing some of the desired objectives of marketing research. Also, is regional research advancing, or are we still discussing the merits of uniform attack versus coordinated attack? Another question relates to whether regional research as conceived under R.M.A. is possible of administration. We might ask ourselves

whether regional researchers have given the same serious consideration to the problems involved in regional research as they have to non-regional problems. Another question relates to whether regional research during the past five years has been more of a program of professional improvement than a research program.

Perhaps beneficial results from regional research have been largely indirect—acceleration of the training of staff members, and more rapid adaptation of the use of new research developments to other areas. If we ask for an accounting as of today some very serious questions might be raised. The results at the end of 10 years might be far better. At least let us hope that they will be.

In the section of his paper dealing with criticisms, Mr. Trelogan points out that three major criticisms have been leveled at our marketing research; that is, criticism of the research, criticism of the research workers, and criticism of the administration of the research program. Someone reading the paper commented that Mr. Trelogan covered the accomplishments of marketing research in paragraphs but limited his criticisms to sentences. Perhaps the criticisms of the research which has been conducted are valid, but that is not to say that it has not been worth-while, nor is it to say that the program should be abandoned. Rather, the conclusion might well be that the shortcomings were to be expected and that a good look will help us to avoid similar shortcomings in the future. Much of the criticism aimed at the research workers will disappear as soon as we obtain sufficient trained personnel. However, the problem of interdisciplinary cooperation is far more difficult of solution. The thought of cooperation among various subject matter fields or areas of work sounds fine on paper but is very difficult to achieve in practice. Always there is the question of what is involved and how far should we go. Maybe specific facts or solutions to problems put together and introduced in practice by the operator in the marketing system will give a more satisfactory total answer than an attempt to solve all of the problems, because anticipated complete solution leads to complications or the setting up of other problems.

On the question of criticism of the administration of the marketing research program, I would like to suggest that attention be given to two points; that is, less consideration to a uniform or agency share and more attention to distribution of funds to those groups in position to do research, or distribution where funds and work should receive additional emphasis. Secondly, there seems to be little fundamental basis for the thought that a completely new organization to administer the new program be set up. I recognize that a new administration would be the usual way of Government. However, it would in all probability lead to more duplication, and less returns per dollar invested than under a system of administration which would take advantage of resources already available at the time the act was passed. We should recognize that marketing research was not conceived with the passage of the Research and Marketing Act of 1946. The act merely gave added emphasis to the work and made possible greater resources, which should lead to a vast improvement in accomplishments.

I agree with Mr. Trelogan that marketing research during the past five years has been worthwhile and that emphasis on marketing research should be continued in order to not only answer current questions but in order to search for fundamental and long-run improvements.

The examples and problems which Dr. Bressler uses in his paper are good ones and deserve close study by students of marketing research. During the past

few years we have heard a lot of criticism of descriptive research—almost to the point that some people have reacted adversely to the description necessary in every research project. I was pleased to see that Ray Bressler recognized the true aspects of description in research, pointing out also the need for going beyond the descriptive stage. The presentation also recognized that it is possible to extend research and resulting conclusions to cover the entire economy, but that such coverage, because of its complexity, is likely to lead to defeat rather than success. We should recognize, as Mr. Bressler did, that research and the entrepreneur function are separate considerations and that many recipients of research do not necessarily want to adopt the results, but actually prefer "status quo."

Perhaps the two major problems involved in research in marketing efficiency might be listed under the headings of selecting the worth-while areas of work and securing the necessary coordination of the various subject matter disciplines involved.

DISCUSSION

A. H. TURNER
Department of Agriculture, Canada

It is my purpose in this discussion to mention one or two features of the papers presented, briefly describe the organization of marketing research in Canada, and to close with a question or two for Dr. Trelogan.

In my opinion, the papers in the time allowed gave an excellent coverage of the subject. They indicated a thorough knowledge of the fields discussed and considerable research into the detail of what was being accomplished. I might have hoped for somewhat less descriptiveness and more penetrating criticism. However, the papers have both raised a number of problems and pointed to areas of progress relating to marketing research as it is now carried on. This will provide those most directly interested with suggestions for consideration of the progress being made or the seriousness of the problems to be encountered.

I am heartily in agreement with Dr. Trelogan when he states that "tangible results are not easily segregated as accomplishments of research because of the close interrelationship with extension and service activities." It seems to me that this is as it should be when dealing with a dynamic operation such as marketing agricultural products. I can vouchsafe from personal association with the decisions on actual sales operations of the Canadian Agricultural Prices Support Board that it is necessary to have teamwork all along the line, if information is to be of the most help to the Board in making its decisions. Progress in actual marketing operations is usually brought about by compromise between reasonable research recommendations or suggestions of what will happen under a given set of circumstances and the existing conditions, as decision-makers see them, at the time the change in the operation is to be effected. As long as the market researcher has played sufficient part in that compromise to make it difficult to say who contributed most, then in my opinion he has served a purpose in marketing progress.

In this connection, I am a little disturbed by the suggestion of Dr. Bressler to put walls around the research and entrepreneurial functions; but I assume that this is mainly for definition purposes. It would seem to me that if the

market researcher is to play his part in immediate or day-to-day problems of marketing, as well as in long term considerations where his function may be more clearly segregated, he has to be closely associated with the entrepreneur even in decisions.

Another point which has been touched upon in both papers in various ways is that of working with the marketers. Too many of our agricultural marketing research men, for some reason or other, prefer to draw conclusions on the basis of a few statistics and the theory of "other things being equal," without working closely with the trade in order to improve the effectiveness of their techniques and the results of their marketing research.

With respect to marketing research in Canada, I would point out that our National Research Council, supported by public funds, has been particularly active in those fields of marketing where the physical sciences are important, such as preservation, storage, packaging, and utilization of farm products. Governments in various departments, both federal and provincial, universities, and private market research organizations are active in various phases of marketing research. We have been active to a greater or lesser extent in fields similar to those in the United States, and have drawn heavily on marketing research results in the United States particularly in recent years. This is an almost inevitable development based on our many U.S. branch plants both at manufacturing and distribution levels, and the general similarity in our economies.

Our Bureau of Statistics, along with other provincial and federal market information agencies, provides us with much of the basic information which is necessary. We have our trade commissioners and agricultural counsellors abroad to give us basic information on foreign markets.

We also have our Economics Division of the Department of Agriculture which, by itself or along with other groups or government agencies interested in marketing agricultural products, probes a little here and a little there in various fields of marketing research such as tariffs and trade, prices, cooperative marketing and business management, commodity problems, marketing costs, transportation, storage, consumer demand and consumer problems generally, as well as various market area, market supply, and market facility problems.

We do not have in Canada the numerous nonprofit research foundations similar to those which operate in the United States, nor do we have anything that compares with Title II Funds under the Research and Marketing Act. With respect to the former, from time to time a United States foundation has been interested in an agricultural marketing problem in Canada. With respect to the latter, I think we can only continue to build slowly and hope that as our foundations are solidly laid there will be funds available to build the walls and roof of the house.

Just a word about personnel. We envy you of the United States your institutions and your training facilities for marketing research personnel. As was pointed out last night, Canadians have been making considerable, in fact very extensive use of these facilities. As a result, we have competition for personnel not only from administrative, teaching, and other work prospects in our own country, but also from United States for Canadians who have advanced training and experience in marketing research. However, since some of our postwar group are now to the stage of sufficient training and experience to make worthwhile contributions, the future with respect to personnel may be somewhat

brighter. For a long time to come, due to the quantity and complexity of the subject matter, it is unlikely that those who prove their ability in this field cannot be usefully employed.

In conclusion, I would like to ask some questions. Dr. Trelogan mentions the reactions of the 22-odd advisory comittees with respect to further expansion of marketing research. Would he say that these advisory committees, particularly if they continue to include the same personnel or the same type of personnel, are not likely to be subject to the same criticism as the consumer panel of "knowing what is desired and obliging"? Would Dr. Trelogan suggest what other criteria, if any, of establishing priorities for research in various fields are used, aside from the recommendations of advisory committees and of State Experiment Stations?

MARKETING DEVELOPMENTS IN CANADA

Chairman: H. R. Wellman, University of California

CANADA'S EXPERIMENT IN STATE TRADING

GORDON L. BURTON
McGill University

IN THIS paper I have attempted to trace the origin and development of Canada's experiment in the trading of farm products by government. Although state trading has not been confined to foodstuffs, by far the greater part of our ventures into this area have been concerned with these products.

The Origin of the Experiment

During World War I, the Government of Canada set the stage for its entrance as a trading monopoly. Since purchases of wheat for the Allied Governments were being made by a single agency, the open market was considered incapable of determining a satisfactory price. Accordingly, a fixed price was set for wheat from the crops of 1917 and 1918; trading in cash grain and futures was suspended and the Board of Grain Supervisors established to act as the selling agency. This first Board did not itself take possession of the grain; it simply supervised sales at a fixed price.

The first Canadian Wheat Board was set up in 1919 and marketed the wheat crop of that year. The structure of this board was to serve as a model for its successor, born some 16 years later. The basic principle followed was the constitution of a government purchasing monopoly paying a fixed initial price to the farmer and, after disposing of the crop, prorating the net proceeds back to the farmer as payment on a "participation certificate" issued when the grain was first delivered into a country elevator.

Despite the popularity of this board with the western farmer, a popularity born of high prices, an apparently greater degree of price stability and a sense of fair play, since all farmers received the same price at the Lakehead for wheat of the same grade, the Board was dissolved in the summer of 1920 and the open cash and futures market again permitted to function. The subsequent sharp decline in the price of wheat intensified agrarian demands for another board. When the Government of the day, somewhat reluctantly, refused to meet these demands, farmers turned to an alternative objective—the organization of a co-operative "pool" in each of the three Prairie Provinces with a central selling agency to perform the merchandising function.

The story of the Pools is well known. Consistently with their philosophy

of self-help, these cooperative marketing agencies preferred to carry the risk of changes in the price of their grain inventories and, hence, used sparingly the hedging facilities provided by the futures market. The Pools appear to have subscribed, for a time at least, to Sapiro's philosophy of regulating the volume of wheat offered for sale as a means of securing a better price. Although sales promotional offices were established in Europe, competition offered by other exporting countries hindered the attainment of this goal.

The crash of 1929 and 1930 served to demonstrate as plainly as anything could that cooperatives are not close substitutes for government boards as price supporting agencies. The Federal Government guaranteed the advances which the Pools had received from the banks and which they were unable to repay because of what proved to have been excessive initial payments to producers. The Pool's Central Selling Agency was used by the Government as a price support agency—an agency seeking unsuccessfully to bolster wheat prices by acquiring modest stocks of wheat and futures contracts.

The second and present Canadian Wheat Board was set up in 1935. Between 1935 and 1943 it functioned along beside the open market. The Board announced, usually after seeding, an initial price which it stood ready to pay for wheat; any net proceeds were prorated back as a payment on delivery certificates. Farmers could either sell to the Board or on the open market, depending upon the price on the latter and, in some instances, upon their philosophy of the role of government marketing agencies.

In this way the Wheat Board served as a price support agency during eight crop years. During some of these years the market price was above the initial price and the Board handled little or no wheat; in others the initial price was above the market and the Board got most of the wheat delivered. Deficits of the order of $80 million were made up by the Treasury, and hence the taxpayer, during this period. The small surpluses realized during some years were returned to the growers.

The Board was directed to sell wheat "for such price as it may consider reasonable with the object of promoting the sale and use of Canadian wheat in world markets." In those years in which the Board incurred a deficit, it was subsidizing (a) the wheat farmer—which was one of the purposes of the Board, (b) the Canadian consumer and livestock feeder, and (c) the foreign importer of Canadian wheat. The incidence of this subsidy as between the farmer and the consumer depended upon the extent to which the differential between the initial price and the market price increased the acreage seeded to wheat (the elasticity of the supply sched-

ule). Since these differentials were very modest, and since the initial price was usually announced after seeding, the wheat farmer seems to have received most of the subsidy; the domestic and foreign consumer got his wheat little, if any, cheaper than he would have in the absence of the Board.

By setting a floor price, the Wheat Board removed some of the high degree of price uncertainty which is characteristic of the open market for wheat. The initial prices set by the Board during the 1935-43 period were forward prices in that they were effective for a crop year. Too, they were usually set at about the expected equilibrium level. However, the prairie farmer was still confronted with a good deal of price uncertainty for his grain since:

(a) The initial price of wheat was, as I have noted, usually set after seeding was over.
(b) No forward prices were fixed for oats, barley, rye and flaxseed—crops which compete with wheat for acreage in the Prairie Provinces.[1]

The Development of the Experiment During World War II

Following Canada's entrance into World War II in 1939, the experiment in state trading was rapidly extended to products other than wheat. Wartime conditions are always favourable to an extension of the arm of Government. The United Kingdom was our most important market for farm products; there the State immediately assumed control over imports in order to save shipping space and to conserve her supplies of foreign exchange.

The precedent for state trading in Canada had been established. In addition, Canada had, under the so-called "Ottawa Agreements" of 1932, been granted a tariff preference of 10 percent in the markets of the United Kingdom. A Liberal government was elected in Canada in 1935 and in 1937 it renewed the Agreement which had been established by the Conservatives under Mr. Bennett in 1932. Canada secured a quota for export to the United Kingdom of 280 million lbs. of bacon, 60 million lbs. of cheese and 60 thousand head of beef cattle. Prior to the outbreak of war, the Government, however, had no authority to enforce delivery under these quotas and did not attempt to do so.

In 1939 the War Measures Act was brought into force giving the Federal

[1] Although the Wheat Board Act of 1935 permitted the Board, with the approval of cabinet, to apply the terms of the act to coarse grains and flaxseed, this was never done and the provision was removed in an amendment passed in 1939. The authority to handle oats and barley was restored in an amendment passed in 1948.

Government the authority to buy, and enforce delivery, and to sell. Export contracts were negotiated and government boards established in Canada to purchase food to meet these contracts and to handle shipments to the Ministry of Food in the United Kingdom.[2]

Between 1939 and 1944 contracts were established for a one-year period specifying quantity, quality, and price. In 1944 agreements for bacon, cheese, eggs, and beef covered a two-year period. The contracts were "open-ended" in the sense that no provision was made for penalties in the event that Canada failed to ship the quantity specified in the contract. Between 1939 and 1945 Canada filled most of these commitments and in some cases exceeded the minimum amounts specified. The early contracts were for bacon, cheese, and apples; later a number of others were added, including canned and dried milk, beef, mutton and lamb, vegetables and flax fibre.[3]

Controls over exports were essential to the effective administration of the export contract program and these were established. In order to permit the export of surplus feed grains into the higher priced American market and without inter-governmental contracts, export permits were granted to individual exporters who paid what were known as "equalization fees." These fees were approximately equal to the difference between the controlled price in Canada and the price in the United States. The receipts from these fees were, in turn, distributed by the Wheat Board to those farmers who had delivered feed grains to the Board.

The Boards purchasing contract products in Canada offered the contract price less handling charges. These prices were in turn consistent with the wholesale price ceilings on foodstuffs while the price control program was in effect.

We have traced state trading in wheat up to 1943. Important developments in this area have since occurred. In September of 1943 the Board took over all privately owned wheat in commercial positions and henceforth has remained the sole commercial buyer of wheat. A multiple selling price system was established, with one price to Mutual Aid countries and the domestic consumer, and a second, and higher price, to all other buyers. Trading in cash wheat and futures on the Winnipeg Grain Exchange stopped perforce, since no one but the Board owned any wheat in commercial position.

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[2] General responsibility was assigned to the Agricultural Supplies Board. The actual purchasing and forwarding was carried out by the Meat Board, the Dairy Products Board and the Special Products Board. These boards were all within the Department of Agriculture; the Wheat Board, under the Department of Trade and Commerce, continued to handle wheat exports.

[3] See Frank Shefrin, *Exports of Canadian Farm Products*, Department of Agriculture, Ottawa, February, 1949.

The Anglo-Canadian Wheat Contract

In 1946 Canada entered into what has become a highly controversial four-year contract with the Government of the United Kingdom. Canada guaranteed to ship 600 million bushels of wheat over a four-year period –160 million during each of the first two years at a price of $1.55 and 140 million during each of the last two at not less than $1.25 per bushel in 1948-49 and $1.00 in 1949-50. The exact price in each case was to be determined not later than the last day of the December immediately preceding the crop year. The contract also included a "joker," known as "the have regard to" clause. This clause stated that, in negotiating prices for the last two years, the United Kingdom was to have regard to any difference between the prices paid under the agreement during the first two years and the world prices for wheat during these years.

This agreement was advocated by, and had the enthusiastic support of, the Canadian Federation of Agriculture, of which the Wheat Pools are influential members. In effect, the agreement was a gigantic hedge: no one knew when the agreement was drawn up what the price of wheat would be during these four years. As events have turned out, the farmers were "bears" when they should have been "bulls." Although the agreement formally covered only 600 million bushels, in effect, it covered a good deal more than this, since wheat has been supplied to the domestic market at contract prices.

Wheat, over and above commitments under the Agreement and for domestic use, was sold for export by the Board for the best price obtainable. The average prices received for contract and Class II wheat during the life of the Agreement were as follows:

Crop year	*Contract price $ per bushel*	*Class II price $ per bushel*
1946-47	1.55	2.43
1947-48	1.55	2.88
1948-49	2.00	2.23
1949-50	2.00	2.16

The United Kingdom took the position that nothing was owing Canada under the "have regard to clause" and the Canadian Government appears to have agreed. Nevertheless, $65 million was appropriated by Parliament this year to enable the Wheat Board to make a higher final payment on wheat delivered during the Agreement.

Estimates of the loss vary between $300 and $400 million. These estimates have been challenged by supporters of the Agreement on the grounds that, in its absence, Britain would have bought more wheat from the United States and less from Canada because of the "surplus com-

modity" provision under E.C.A. A less cogent argument is that if the 600 million bushels sold to Britain had been thrown on the world market it would have depressed prices.

Needless to say, the Agreement has stirred up some acrimonious arguments both in and out of Parliament. The Federation of Agriculture has supported it on the grounds that it has had a stabilizing effect upon Canadian agriculture. The private grain trade, which now functions as agents of the Wheat Board, argue that administered prices are not satisfactory substitutes for freely determined market prices and that farmers have suffered severe losses.

There can, I think, be no question that western wheat growers have taken large monetary losses. On the other hand, if wheat prices had declined below $1.25 and $1.00 during '48-'49 and '49-'50 they would have gained from the Agreement. Perhaps a part, at least, of these losses should be considered as an insurance premium. Since the Agreement has been supported by large numbers of western farmers one might argue that if the wheat producers themselves prefer to accept a lower but more certain price for their own product they may not be criticized for doing so.

The International Wheat Agreement, which came into effect on August 1, 1949, overlapped one crop year with the Anglo-Canadian Agreement and has now replaced it. For the five crop years 1945-46 to 1949-50 the C.W.B. operated a single pool with all growers receiving the same price, basis the Lakehead, for the same grade of wheat. Beginning with the crop year 1950-51, the Board has returned to a single year pool. The objective of the five-year pool was apparently stabilization of returns to the grower over time; the expectation being that a five-year period would include years of both high and low prices. The export contracts and the pool thus constituted a pyramiding of stabilization policies.

State Trading in Coarse Grains

On August 1, 1949, the Wheat Board became the sole commercial buyer of oats and barley just as it has been for wheat since 1943. Prior to taking this step the Government was apparently somewhat uncertain as to how it should price these feed grains. There were no export contracts, and a very high proportion of both the oats and barley crops are fed within the country. Moreover the dairy, beef and poultry farmers of eastern Canada are dependent upon the West for roughly one half of their supplies of feed grains. Western farmers asked that the Board should sell oats and barley "for the best available price whether in export or domestic markets."[4] Eastern farmers agreed that the selling policy should be based

[4] According to a report carried by the Manitoba Co-operator, January 27, 1949, of the meetings of the Western Agricultural Conference, composed of delegates from farm organizations in the four western provinces, meeting in Saskatoon.

"on the free supply and demand situation for coarse grains" but that livestock feeders should be represented along with grain growers, as an advisory committee to the Board.[5]

The initial reaction of the Honourable Mr. Howe, the Minister responsible, was to look to the Canadian Federation of Agriculture "to recommend prices satisfactory both to producers and feeders." The Federation, representing both the growers and feeders, did not rise to this lure.

Both the cash and futures markets for oats and barley have continued to function. The Board establishes its own selling price daily for both cash and futures. An open market price is recorded on the grain exchange by independent traders who have acquired, or expect to acquire, oats or barley from the Board, or from someone else who has bought from the Board.

The Board and market prices rarely differ by more than an eighth of a cent. Officials of the Board subscribe to the view that they establish their price at the market price; there are others who believe that the market follows the Board's price. Perhaps both prices are at the equilibrium level.

Although the Government bears a substantial part of the freight on feed grains shipped from West to East for domestic use, the eastern feeder would like a more stable price, or at least a more certain price, for the grains which constitute so important a part of his cost of producing meat and milk.

This marketing policy for coarse grains, although supported by organized agriculture in the West, is, nevertheless, a controversial one. Manitoba, Saskatchewan, and Alberta have passed complementary provincial legislation, but Manitoba is holding a referendum this coming autumn to determine the proportion of grain growers in that province who support the policy.

The End of the Bilateral Export Contracts

Confronted by a shortage of dollars after the War, Britain again sought supplies of meat, eggs, and dairy products from her traditional suppliers in Europe and attempted to continue and expand her forward contracts with New Zealand and Australia. No bilateral contracts with Canada now exist. Canada, too, plagued for a time by a shortage of U.S. dollars, has removed the embargoes which prevented farm products from moving into the United States. Beef and beef cattle have moved freely since the fall of 1948 and grain, pork, hog, cheese and milk exports are now limited only by tariffs or other restrictions imposed by the United States.

The Government of Canada still has authority to purchase any farm

[5] According to a resolution passed by the Ontario Federation of Agriculture at their Annual Meeting in 1949.

product in Canada (other than grains) and to enter into export contracts for such products under the terms of the Agricultural Price Support Act of 1944. Under this authority the Prices Support Board has guaranteed a two year forward price for butter and is attempting to limit the range of seasonal variation in price to the costs of handling and storing.

The buoyancy of the postwar market for food has enabled Canada to limit price support to a relatively few commodities.

Conclusion

After 12 years of trade in farm products with Britain under the terms of bilateral export contracts, Canada has finally abandoned this particular form of state trading. We did not surrender this practice easily; during the last year of the contract for bacon and cheese, Canada sold both of these commodities to Britain for less than the Government paid Canadian farmers. The present Government is a staunch supporter of the International Wheat Agreement, notwithstanding the recent, and protested, increase in carrying charges. The practice of state trading within the country is still firmly entrenched and both enjoys widespread support and offers a target for vigorous criticism.

Support for state trading stems, I think, largely from the greater degree of price certainty which it affords. The farmer in the Great Plains area of Canada must still cope with highly variable yields. Under an open market he is as helpless in preventing a possibly disastrous decline in the price of grain. Under a Wheat Board he has some chance, through his organizations, of persuading the Government to maintain a price for grain which is more or less consistent with the prices of the materials and labour used in producing that grain.

Many Canadians, too, are convinced that the United Kingdom, in spite of its policy of producing a maximum of foodstuffs at home, almost without regard to cost, offers the most stable market for Canadian farm products. There is a feeling that the American economy belongs to the "boom and bust" family and will not offer a dependable market for our surplus food. The beef producers are proud to be excluded from this group of sceptics. A rapidly expanding population in North America may tend to restore confidence in the future of the market for food on this continent.

One serious defect of the bilateral contracts was the horse-trading which accompanied the renewal of contracts. It was not always possible to conduct the necessary bargaining in the spirit of mutual goodwill which characterizes our relations with the people of the United Kingdom. Too, although the contracts offered a greater degree of price certainty during their tenure, there was always much uncertainty as to whether they would

be renewed and under what terms. Economists can sometimes more or less correctly anticipate prices based upon supply and demand working through an open market. No one can guess what will come out of a bargaining session between two governments.

Perhaps a less obvious defect of state trading is that it tends to obscure the important role of the price system. Canadian farm leaders occasionally seem to forget that price provides the mechanism, however imperfect, which informs producers of what consumers want. There is a tendency to believe that buyers and sellers can sit down and arrive at some sort of a price which is "fair" to both—almost without regard to the effect of such a price on production or consumption.

Finally, state trading necessitates the use of a whole host of controls which seem inconsistent with the spirit, if not the letter, of the efforts of western countries to promote freer trade.

THE ONTARIO MARKETING BOARDS

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MARKETING legislation has now been a matter of current interest and current discussion in Canada for upwards of 25 years. The discussions have led to an important farmer movement. The subject also raises a number of controversial points in constitutional law on which few lawyers agree.

Background

Beginning in 1920, farm prices and incomes fell severely in a country heavily dependent on exports of primary products. Not only had farm incomes declined from 1920 to 1922, but the recovery of raw materials prices to 1929 had been modest. Real depression began in 1929 and from then until 1933 intensified. Farmers looked for some means or other of resisting the fall in their incomes and turned to marketing adjustments, as the United States had done under the Federal Farm Board in 1929 to 1931, and as the Province of British Columbia attempted to do under its Produce Marketing Act, 1927, and its Dairy Products Sales Adjustment Act, 1929. During the 1920's, and especially from 1927 to 1929, Canada witnessed a burst of consolidation in its food product industries. Canadian Canners Limited absorbed many small fruit and vegetable canning companies, particularly in Ontario. Canada Packers Limited absorbed four meat packing companies. Consumers in western Canada, along with British Columbia and Ontario fruit and vegetable growers, feared the Nash combination, which was dominant in the sale of fresh fruits and vegetables in the four western provinces. In part, these consolidations represented larger firms absorbing smaller ones which had excess capacity, but farmers were suspicious of the reduced number of buyers for their products. The Royal Commission on Mass Buying and Price Spreads in its hearings in 1934 had widely publicized certain aspects of large-scale buying, which convinced farmers that the incidence of the depression was falling with undue severity on the prices of farm produce. For these and other reasons Canadian agriculture supported the passage of the Natural Products Marketing Act by the Government of Canada in 1934.[1]

The Natural Products Marketing Act (Canada)

The Natural Products Marketing Act (Canada) 1934 was largely patterned on the British Agricultural Marketing Acts of 1931 and 1933.

[1] M. W. Farrell, "Experience with Provincial Marketing Schemes in Canada," *this Journal*, November, 1949.

This form of organization was originally developed in Queensland, Australia, and took its first shape there in the Queensland Wheat Pool Act of 1920, which in turn was followed by the Queensland Primary Products Act of 1922. The essential feature of the Australian Acts and subsequently their British and Canadian counterparts is that *where the majority of the producers of a commodity desire to sell their product collectively, the minority may be compelled by law to join in a common sales policy.*

The Natural Products Marketing Act (British Columbia)

Simultaneously with the passage of the Natural Products Marketing Act (Canada) 1934, the Province of British Columbia—which in 1927 and again in 1929 made two ill-fated legislative attempts at agricultural marketing legislation—passed a Natural Products Marketing Act, 1934, almost identical in substance to the Natural Products Marketing Act (Canada), 1934. British Columbia's 1927 Act had been declared *ultra vires* provincial jurisdiction by the Courts in 1931 because it infringed Dominion jurisdiction in matters of inter-provincial trade. Its 1929 Act had been declared *ultra vires* provincial jurisdiction by the Courts in 1932 because the levies provided that equalization of prices were determined to be indirect taxes, likewise an exclusive Dominion field. Consequently, the British Columbia hope for its 1934 Act, in conjunction with a virtually similar Dominion Act of the same year, would enable any marketing organization set up in British Columbia to draw its powers from either or both sources and consequently be legally foolproof from attack within the constitution of Canada.

Final Settlement of Provincial-Federal Marketing Responsibility

But the process of law was not yet complete. The validity of the Natural Products Marketing Act (Canada) was questioned and the matter was referred to the Privy Council, London, England, for an opinion. In 1937 the Privy Council declared the Federal Act unconstitutional, on the grounds that it infringed upon provincial jurisdiction over matters of property and civil rights and individual forms of trade and commerce confined to the provinces. Subsequently the Privy Council upheld the *vires* of the Natural Products Marketing Act (British Columbia). This very important decision established the right of each province in Canada to provide for the effective regulation and control of the marketing and transportation of natural products within each province. The authority to regulate and control the marketing of natural products in inter-provincial and export trade rested with the Canadian Government, whose authority furthermore was strictly limited to this field.

The foregoing attempts to summarize the legal "no man's land" that

existed during the 1930's in respect to marketing legislation in Canada, and indicates the now established limits of provincial and federal jurisdiction in this field.

Agricultural Products Marketing Act (Canada) 1949

The circle was completed when the Canadian Government passed its Agricultural Products Marketing Act (Canada) in 1949 at the request of the Canadian Federation of Agriculture. Under this act, one of the shortest statutes on record, Provincial Marketing schemes on certification by the Canadian Government may have "like powers" granted them by their province extended into the inter-provincial and export field. In this way was lifted the effect of the limitation by the 1937 Privy Council decision that *intra vires* provincial legislation extended only to the marketing of a product for consumption within that province or for sale to another person within that province. Marketing regulation of a farm product sold anywhere is now possible under a combination of Provincial and Canadian law. It is important to note, however, that the Canadian Government will not extend to any provincial marketing scheme powers in inter-provincial and export trade which the government of that province has not already extended to that scheme for intra-provincial trade.

Three Ontario marketing schemes, i.e., the Ontario Cheese Producers' Marketing Scheme, the Ontario Dry Bean Growers' Marketing Scheme and the Ontario Winter-Celery Growers' Marketing Scheme, have now had the powers granted them by the Province certified under the Agricultural Products Marketing Act (Canada). Thus the marketing of the regulated products by the local boards established under these schemes has been extended to include the inter-provincial and export sale of these products. It is expected that several other Ontario marketing schemes will be making similar applications in due course.

Farm Products Marketing Act (Ontario) 1937

As soon as the Privy Council declared the Natural Products Marketing Act (Canada) unconstitutional, the Ontario Legislature passed the Farm Products Control Act, 1937, with similar objects and powers to the Federal Act. The Ontario Act had the unanimous approval of all members of the Legislature when it was passed—a fact worth noting. In 1946 the act was amended in a number of its provisions for clarification and its name changed to The Farm Products Marketing Act (Ontario). The purpose of the act is to provide the necessary legislative machinery to enable agricultural producers of designated crops to cope with the rapidly changing practices and methods of modern business. Essentially the act

is the legally constituted means for either (1) the collective bargaining and sale of designated farm products, or (2) the actual marketing by local boards, acting as agents for the producers, of designated farm products, including the physical handling of the particular product or products.

Chief Provisions of the Act

Among the various provisions of the Ontario Farm Products Marketing Act, perhaps the chief one is the authority enabling the Ontario Minister of Agriculture to recommend approval of any producer marketing scheme after a "reasonably favourable" vote by signed ballot has been taken of the farmers concerned. In practice, "reasonably favourable" has been interpreted as 66⅔ percent "yes" vote of all those eligible to vote. An existing marketing scheme which does not enjoy the continued support of its members may be revoked in the same way. It will be noted at once that this is a much more stringent provision than obtains in an ordinary election where the successful candidate is elected by a simple majority of those actually voting.

The second provision of the act of interest at this point is the section which creates The Ontario Farm Products Marketing Board. This Board, comprised of Senior Officers of the Ontario Department of Agriculture, administers the act and to a degree supervises the operation of each marketing scheme approved under the act.

In addition to the two provisions just mentioned, the act contains practically all the authority found in any compulsory marketing legislation. Basically, it provides for the establishment of producer local boards which are empowered, with certain limitations, to regulate and control the marketing of agricultural products within the Province. In the case of Ontario, however, considerable care has been taken by the Provincial Legislature to define the specific powers which may be delegated to producer boards by the Farm Products Marketing Board, and to define the specific powers to be administered by the Farm Products Marketing Board itself. In this respect, the operation of marketing schemes in Ontario is distinct from that of any other province in Canada.

Briefly, the following are the main powers which may be delegates by the Farm Products Marketing Board to any producer local board:

1. the right to investigate and settle disputes concerning any regulated product,
2. the right to investigate costs of producing, processing, distributing or transporting any regulated product,
3. the right to establish price negotiating agencies and adopt or determine *minimum* prices, conditions and forms of contract, terms of purchase and

sale and handling, storage and selling charges for any regulated product or for any class, variety, grade, or size of a regulated product,

4. the right to require persons engaged in the producing or marketing of a regulated product to register their names, addresses, and occupations with the local board,
5. the right to provide for the pooling of the proceeds of the sale of any regulated product,
6. the right to exempt any person or class of persons from any scheme or any order or direction of the local board,
7. the right to inspect the books and premises of any person engaged in the marketing of any regulated product,
8. the right to require the furnishing of proof of financial responsibility by any person engaged in the marketing of a regulated product,
9. the right to prohibit the marketing of any grade or size of any regulated product,
10. the right to accept authority from the Canadian Government to control the inter-provincial and export sale of any regulated product, and
11. the right to cooperate with similar producer local boards of other provinces by marketing cooperatively or otherwise.

The following powers may not be delegated to any producer marketing board by the Farm Products Marketing Board and may be invoked by it only on the approval of the Lieutenant-Governor in Council:

1. the right to regulate and control the marketing of any regulated product including the appointment of exclusive marketing agencies through which such product may be marketed,
2. the right to licence persons engaged in the marketing of any regulated product and to renew, refuse, or suspend such licence, and
3. the right to levy licence fees or service charges and their specific amount on any regulated product, in order to pay the operating expenses of producer marketing boards.

Finally, there are penalties provided for breaches of the act.

Method of Operation

From the foregoing it will have been noted, particularly by those familiar with this program in Canada, that there are fundamental differences between the operation of compulsory marketing schemes in Ontario and in the other provinces, chiefly British Columbia, Saskatchewan, and Nova Scotia.

Several reasons account for this situation, of which the following are the most important:

1. The main market for agricultural products in Ontario is the domestic market. Except for bacon, cheese, and beef cattle, Ontario consumes practically all its agricultural products at home and in the case of several farm crops, the Province is not self-supporting. Except for the Province of Quebec, this situation is reversed elsewhere in Canada, where the

main market for most agricultural products is outside the province where production took place.

2. Ontario geographically covers a large area. It comprises several cities, towns, and villages interspersed with highly specialized farming communities in the older sections, all of which are connected with a complete network of paved highways. The result is that with modern transportation facilities, almost every Ontario farmer has a local market practically at his back door. The degree of regimentation and the expense of operating a "100 percent one-desk deal," as the compulsory marketing schemes of British Columbia and Nova Scotia are popularly described, here where the entire crop of one or more regulated products is sold through a single sales agency, chiefly for shipment out of the Province, would be prohibitive in most instances under Ontario conditions.

3. Because of the many local markets in Ontario, the practice of farmers selling retail or direct to consumers is actively encouraged. In fact, the Farm Products Marketing Act specifically exempts such transactions from control or regulation by any scheme, except where the retailing is by large organizations maintaining separate warehouses and operating five or more retail outlets.

It is for these reasons that Ontario Marketing schemes act for the most part as the media for negotiating and establishing minimum prices, terms of contract and conditions of sales in each crop year for the products under regulation. Control of the regulated product is not taken over by the Ontario producer marketing boards as the farmer's agent, as in British Columbia and Nova Scotia, but remains with the farmer until sold by him, subject to the terms of the negotiated agreement for that product.

Schemes in Operation

Presently there are 15 producer marketing schemes in operation under the act, viz.:

The Ontario Cheese Producers' Marketing Scheme, 1937
The Ontario Asparagus Growers' Marketing Scheme, 1938
The Ontario Pear, Plum, and Cherry Growers' Marketing Scheme, 1938
The Ontario Peach Growers' Marketing Scheme, 1938
The Ontario Sugar Beet Growers' Marketing Scheme, 1942
The Ontario Seed Corn Growers' Marketing Scheme, 1942
The Ontario Berry Growers' Marketing Scheme, 1944
The Ontario Bean Growers' Marketing Scheme, 1944
The Ontario Vegetable Growers' Marketing Scheme, 1946
The Ontario Hog Producers' Marketing Scheme, 1946
The Ontario Cream Producers' Marketing Scheme, 1947
The Ontario Grape Growers' Marketing Scheme, 1947
The Ontario Soya Bean Growers' Marketing Scheme, 1949

The Ontario Winter Celery Growers' Marketing Scheme, 1949, and
The Ontario Honey Producers' Marketing Scheme, 1950.

The following 24 farm crops have been designated regulated products by virtue of the marketing schemes in force: cheese, sugar beets, seed corn, dry beans, hogs, cream, soya beans, winter celery, honey; and the following fruit and vegetable crops when sold only for canning or for other processing purposes: peaches, pears, plums, cherries, grapes, strawberries, raspberries, tomatoes, green peas, sweet corn, green or wax beans, beets, carrots, and cabbage.

A brief comment on the operation of the marketing schemes will illustrate the scope of their marketing activities.

Each scheme provides for the appointment of a Negotiating Committee of six or 10 persons of whom three or five are producers appointed by the producer marketing board concerned, and three or five are buyers appointed by the dealers or processors handling the regulated product in question—all of whom are licenced under the provisions of each scheme. This Negotiating Committee is empowered by the regulations of each scheme to negotiate minimum prices, terms of contract, and conditions of sale which shall apply to the marketing of each regulated product in each year. The authority of all marketing schemes is limited to the first sale of the regulated product from the producer to the buyer.

Negotiating Committees for each regulated product meet annually or as often as required. If they can reach agreement, they so report in writing to the Farm Products Marketing Board, and the Board then issues an order approving the agreement, thus giving it the effect of law. No buyer may then do business on terms below those set out in the agreement.

If the Negotiating Committee cannot reach agreement, provision is made for a Board of Arbitration, with the three or five producer representatives appointing one member, the three or five buyer representatives appointing one member, and these two appointed members selecting the third member. If the third member cannot be agreed upon, the Farm Products Marketing Board appoints the third member. Agreements reached by Boards of Arbitration are final on approval by the Farm Products Marketing Board.

Occasionally, situations arise where the buyers have refused to appoint their representatives to Negotiating Committees or Boards of Arbitration. In such cases, the policy of the Farm Products Marketing Board is to offer to appoint a Negotiating Committee or Board of Arbitration for the particular regulated product in dispute. If this is not acceptable, the Farm Products Marketing Board itself sets the minimum price and terms of contract for that regulated product in that crop year. This has hap-

pened only on three or four occasions in the Board's history. The authority is provided, however, to cover such a situation, as there must be finality somewhere in price and contract negotiations so that no dispute may be stalemated too long, particularly when perishable products are concerned. Except for rare cases of non-compliance with the regulations, the main point throughout this procedure is that joint committees of equal numbers of sellers and buyers are empowered by law to set the minimum prices and other terms of sale for each regulated product each season. The Farm Products Marketing Board's job is to see that the negotiations take place, that decisions are made, and that the agreements reached are enforced on all concerned.

Exceptions

The foregoing reviews the method of operation of 12 of the 15 marketing schemes now in effect in Ontario. Two of the 15 schemes have not developed to the point where minimum prices and conditions of sale are being established for the regulated products covered by them. These are the Ontario Hog Producers' Marketing Scheme and the Ontario Cream Producers' Marketing Scheme.

The Hog Scheme. The hog industry is perhaps the most important branch of Ontario agriculture, both in volume and value of production and in number of producers affected, to come under the provisions of the Farm Products Marketing Act.

The Negotiating Committee of producers and packers appointed under the regulations of the scheme has continued to meet monthly since the scheme was approved five years ago, and has made a worth-while contribution to the industry in its reports on losses due to bruising, on feed supplies, quality programs, and improved methods of distribution. Despite the complicated problems involved, particularly as a substantial volume of live hogs are shipped out of Ontario annually, progress has also been made in negotiating uniform "conditions of sale" for hogs throughout the Province.

The Cream Scheme. Rating equally with the hog scheme in the number of producers affected but totalling something less than half its value of production, the cream scheme covers the second industry of importance in Ontario agriculture to come under the provisions of the Farm Products Marketing Act. Despite the difficulties involved in the marketing of a raw product in which the Province is not self-sufficient in the finished product made therefrom, Ontario cream producers have made progress in their negotiations with the creamery operators on such matters as premiums and discounts for the various grades of cream, quality programs, transporta-

tion economies, and other problems related to the marketing of sweet cream for butter purposes.

The Cheese Scheme. One Ontario marketing scheme has been reserved for last place special mention in this paper. It is the Ontario Cheese Producers' Marketing Scheme, the first scheme to be approved after the Farm Products Marketing Act was originally passed by the Ontario Legislature in 1937.

Cheese, and I am referring here to matured cheddar cheese for which the only comparable product is English farm cheese, is of historical importance in Ontario agriculture. As far back as 1679, cheese was being made on the Island of Orleans, Quebec, and there are repeated references to cheese in early Canadian history. Farm cheese was an article of commerce at the village stores in Ontario before 1860, and shortly after that the first cheese factory was started and the "cheese boom" was on. Within a few years, over 300 factories were operating, sometimes four at a crossroad, and farmers were investing in cheese factories as they were later to "invest" in western land, gold stocks, and now in oil. By the turn of the century there were almost a thousand cheese factories, located for the most part in Ontario and Quebec. Exports of cheese, chiefly to the United Kingdom, had increased to such an extent that by 1900 total shipments out of this country alone totalled more than 200 million pounds annually. Cheese was one of the greatest of the early manufacturing booms in this country and contributed much to the early prosperity of Canada.[2] Since that time production has declined, due to the growth of population and the use of milk for other purposes. Nevertheless, cheese production until recent years has always remained substantial, and since it was the one milk product sold on world markets, cheese has always been known as the "balance wheel" of the Ontario dairy industry.

In its early years the Ontario Cheese Producers' Marketing Scheme made no notable contribution to the welfare of the industry. In its defence, however, the scheme was being operated during a period of legislation particularly inadequate for a product over 80 percent of which was exported out of the Province, and over 50 percent of which was exported out of the country. The Scheme did manage, however, to perfect the uniform open auction system of sale for cheese. This had been the system for the past 50 years, but the development of "regulars" or "curb selling" had reached the point where only 35 percent of the cheese produced was being sold at the regular weekly auctions. The Cheese Marketing Scheme stopped this practice the first year it was in effect. Then World War II intervened, and the annual cheese contract of the

[2] *The Retail Grocer and Provisioner,* June, 1951.

Canadian Government with Great Britain for the past eight years, together with the requisitioning of all cheese during the flush months of production in each year at a fixed price to fill the contract, effectively nullified any plans the cheese producers had for the marketing of their product.

With the expiration of its 1950 cheese contract the Canadian Government announced there would be no contract negotiated by it in 1951. The way was thus cleared for Ontario cheese producers to enter the marketing field on their own account. That something drastic was necessary was obvious, as the price of recent years had been so low in relation to production costs that it threatened to wipe out the once thriving cheese industry in Ontario. Production was now down to 69 million pounds, and a further 45 factories closed in 1950, bringing the total down to 403 plants, or some 150 less than the number operating five years ago.

The cheese producers' first step was to build at Belleville, Ontario, in the heart of the cheese producing area, a modern cheese cold storage and curing plant capable of holding between five and six million pounds of cheese. Their second step was to have their marketing scheme completely revised to take advantage of the several marketing powers which had been added to the Farm Products Marketing Act from time to time since 1946. Their third step was to have their marketing scheme approved under the Agricultural Products Marketing Act, Ottawa, so that their provincial marketing powers would be extended to the inter-provincial and export field. Their fourth step was to make history in concluding a contract with the British Ministry of Food for 20 million pounds of cheese this year at a price increase of seven cents per pound over that paid in 1950. It marked the first time that organized dairy farmers in Canada successfully negotiated for the bulk sale of their product. Their fifth and final step to complete their program was to negotiate an agreement with the produce trade for cheese consumed in Canada this year at a price six cents per pound higher than the British contract price for cheese exported—something entirely new in the trade. The two prices, export and domestic, will be blended so that all cheese milk producers will share equally. Net result, on the assumption there will be two pounds of cheese consumed domestically to one pound exported this year, is a fair assurance to cheese milk producers that they will receive about $3.00 per hundredweight for their milk, depending on its test this year—a 50 percent improvement over their 1950 price. Ontario cheese producers, for 1951 at any rate, have put themselves in a position to take care of the surplus in the home and export markets so that a surplus, however small, cannot be used to batter down the price at which the bulk of the production sells. This is the first time an Ontario producer marketing board has moved in the direction of the British Columbia

marketing schemes by taking control of the product and selling it for the producer as his agent.

Conclusion

Perhaps, before closing, a few general remarks might be made to review some of the main purposes and objects of the Farm Products Marketing Act.

Inasmuch as a substantial majority of the primary producers of any commodity must be in favour of any marketing scheme or plan before it can be approved, it must be admitted that the legislation is fundamentally democratic.

The legislation makes it possible for primary producers to accomplish collectively many things which they are unable to accomplish individually. There are opponents of collective bargaining whether as applied to terms of employment by employers and organized employees, or whether as applied to terms of fair prices for farm products by primary producers and buyers of those products. Some consider there is an infringement of freedom. It is true, however, that employers are not compelled to employ labour, nor are buyers compelled to buy farm produce. There is just as much need for and reason in a minimum price for farm products as there is for minimum wage laws. Basically, the legislation is intended to give producers a direct and equal voice in marketing their own products with the buyers. It makes possible the establishment and maintenance of a minimum price based on crop and market conditions. It aims to prevent unjustified price-cutting. It proposes to stop market practices which a small minority in any industry group seem willing to indulge in where the number of sellers greatly exceeds the number of buyers, as in agriculture.

Somewhere recently I read that it is commonplace to say that farming has changed since grandfather's time. He produced to eat. He produced to fill his pork barrel, his storage bin, and probably his cider kegs. He ate well if he produced abundantly.

Today's farmers produce for the market rather than for their own needs. One farmer today feeds seven families in the United States compared to three families just 50 years ago, and one and one fourth families 100 years ago. I imagine the situation is roughly the same in Canada. Agriculture has become specialized. We trade more. We handle more money. We find more of our problems beyond our line fence. We are more dependent on others and more people are dependent upon us. This interdependence and specialization in agriculture have driven farmers to take an increased interest in their marketing problems.

Marketing legislation puts this problem on a group basis. A marketing scheme simply means group bargaining. Group bargaining can be very

effective if wisely used. It can be the least expensive and the most efficient means of satisfying certain economic needs of farmers compared to organizing cooperatives, building warehouses, buying machinery, owning trucks and investing more heavily off-the-farm in order to be more effective in the market place.

Group bargaining in agriculture is still in its infancy in this Province. But our farmers know a lot more about it now than the use they have made of it thus far would indicate. How wisely they will use this new instrument, only time will tell.

DISCUSSION

JOHN D. BLACK
Harvard University

Mr. Perkin's paper should be of wide interest to agricultural economists the world over. It reports a development with possibilities of further progress under certain types of situations that probably exist in many places around the world. It could become the general pattern for pricing of farm products in primary markets. If it did, it would replace both competitive pricing and cooperative marketing. These are aspects of the subject to which Mr. Perkin gives little attention, and are much better developed in the excellent paper dealing with Canadian marketing schemes generally, by Professor M. W. Farrell of the Ontario Agricultural College.[1]

It is clear from both Mr. Perkin's and Professor Farrell's papers that the type of situation in which the Canadian-type marketing scheme fits best is one in which the product is produced in a limited area and the buying is done by one or a few buyers. Given such a situation, the price offered by the buyers, whether by deliberate concerted attempt or by the ordinary workings of competition under such conditions, as brought out clearly by the theory of so-called monoplistic competition, may well be lower than a true competitive price, and the price to consumers higher than truly competitive, leaving the middlemen and processors in between an unduly high margin. This is particularly likely to be true with farm products because farmers contract output slowly with reduced prices.

Given such a situation, a negotiating committee of the Ontario type may be able to raise the price by collective bargaining, with the higher price coming entirely out of the monopoly profits of the buyers. And this is all good. There are, however, two serious dangers in such a situation. The most likely one is that the monopolists will try to pass their higher buying prices on down the line to the consumers. In this case, consumption may be reduced and the processors will not be able to buy all that is produced. There is nothing in the Ontario law that forces the buyers to take the whole supply. This has happened in the present strawberry canning season in Ontario. The committee set the price at 18½ cents per quart. The crop was larger than the canners wanted. Growers begged the processors to take their supplies at 15 cents a quart or even less, and some strawberries were hauled 450 miles to Quebec canneries.

The related and more serious danger is that the higher price to producers

[1] *This Journal*, November, 1949.

will induce an increase in production. It has clearly done so in several cases in Ontario.

In either of these situations, the growers may very well get a smaller net return for their whole crop than before. *Whether or not this is true has not been determined in any deal with any crop so far as the literature on the subject has come to my attention.*

Analyses of this sort can be made. In fact, my son, Guy Black, of the College of Agriculture of the University of California, has just completed an analysis of somewhat related experience with raisin and wine grapes in California. The first undertaking of this sort which he has analyzed was under the Federal Farm Board and involved paying the growers for leaving 300,000 tons of grapes on the vines. Another undertaking was made under the California Agricultural Prorate Act and involved creating a 20-percent surplus pool and diverting much of this to cattle feed. The analytical procedure which Guy has applied to this is designed to determine what price for grapes and what utilization of these will optimize aggregate net returns to producers. Obviously this involves the shape of the demand curves for the product in its different uses, even in its diversion uses, as well as the costs of harvesting and marketing different sized crops.

Even this, as Guy fully recognizes, is not a full analysis of the type that the Province of Ontario needs to have made if such a program is to be a permanent part of its economy. Analysis needs to be carried back to the farms where the product is produced, not to determine unit costs of production, which have very little meaning in such a use (or in any other, for that matter), but to determine what quantities of output of this product at what price will optimize the net returns to the growers. This calls for budget analysis of a representative group of farms. Out of this can also be constructed supply curves, as was done for dairy production in 10 areas in the United States as reported in a recent book, *Interregional Competition in Agriculture*.[2] At the consumer end, there will be needed the counterpart demand curves showing the relations between retail prices and amount consumed. Any effects of volume handled on distributing and processing costs must also be taken into account. Out of such analysis should come some set of relationships that will enable the Ontario Farm Products Marketing Board to determine whether or not the prices recommended by its Negotiating Committees are in the interests of the Canadian economy and indicate to them wherein they are not. The Negotiating Committees need such guides to their decisions. Such guides may take the general form of the price formula for milk now operating in the Boston and other milksheds.

One of the problems connected with such a program is that of keeping such relationships adjusted to changing technologies of production, processing, and utilization. On the production side, a set of index numbers of changing receipts and expenditures, each of these being broken down into Price times Quantity components, as done for 32 types of farming in New England in Chapter 30 of *The Rural Economy of New England*,[3] will go far to meeting the needs in the interims between repeat analyses.

For products with wider sources and with a wider market, the markets are likely to be more nearly competitive, and as has already been discovered by experience in Canada, the major contribution of marketing schemes may well prove to be the correction of certain irregularities in the functioning of auctions

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[2] R. L. Mighell and J. D. Black, Harvard University Press, July 1951.
[3] J. D. Black, Harvard University Press, 1950.

and exchanges, plus certain types of assistance to producers along the lines of standardization and quality control. Where interprovincial marketing schemes develop, the analysis of the sort outlined in the foregoing needs also to be interprovincial.

The recent experience with cheese outlined by Mr. Perkin points to a very simple and highly restricted conclusion, that in the setting of a price under state trading with the United Kingdom, a provincial negotiating committee is in a much better position politically than is the Dominion Government, or even a provincial government. Even in the United States, it would be wise to let the United Kingdom do its collective bargaining directly with the American Cranberry Exchange, the big California cooperatives, and the like.

The alternative to what has just been outlined is that the Canadian marketing scheme blunder along, making fewer mistakes as the years go by. At any time, however, that a sudden reversal in general business trends sets in, these mistakes are likely to have serious consequences. It cannot be too strongly emphasized that the Canadian schemes largely came into hurried existence in the depression years of the 1930's. They were conceived of as a way of getting higher prices—as something better than the government price-support program of the United States. They can achieve this only in a small way in a depression period, without supplementary payments out of the Government Treasury. And it is doubtful if holding up prices to producers is good procedure in such situations.

In conclusion, a well-established producers' cooperative would seem to have important advantages over these marketing schemes. But to build such cooperatives takes many years. It is highly probable that agricultural producer groups generally will not want to build thus slowly, and will seize upon the marketing schemes as a quick makeshift. But these are not likely to serve effectively year-in and year-out until they have analyzed their situations in the manner herein indicated.

DISCUSSION

E. C. HOPE
Canadian Federation of Agriculture

The papers presented by Mr. Perkin and Dr. Burton both provide excellent pictures of the development of marketing in Canada. Mr. Perkin's paper deals with the history of marketing legislation in Canada and the Province of Ontario. Dr. Burton's deals with some of the experiences of Canada in the state marketing of farm products.

The title of Dr. Burton's paper, "Canada's Experiment in State Trading," is perhaps a little misleading. One generally embarks on an experiment after very careful thought on the problem, usually to test a given theory. Canada's venture into state trading in farm products does not quite fall into this category. Canada was more or less forced into the position of accepting state trading by the pressure of historical events.

The Wheat Pools survived the world-wide depression of the '30's with the aid of government guaranteed loans. This led to temporary government management of the Pools' Central Selling Agency. The prolonging of the depression, resulting in large wheat stabilization holdings of the government-managed agency, led to a demand for a full-fledged Government Wheat Board to sell the accumulated holdings and to handle the coming crops in a very depressed world market.

The first Wheat Board Bill of 1935 provided for a State Wheat monopoly–a compulsory pool. But as finally amended, the act provided for a voluntary pool. As Dr. Burton pointed out, the Wheat Board operated as a voluntary pool until 1943, when under the pressure of war necessity it was decided that as a temporary measure the pool should be compulsory. In 1945 the act was again amended to provide for an extension of the compulsory pool in order to facilitate the British Wheat Agreement and the five-year Pool of 1945-50. When the life of the amendment expired in 1950, further amendments prolonged the "experiment" if you like to call it so, of a state monoply in wheat until August 1953. At that time the Government will again have to make a decision in which direction it will go.

Apparently the Government has not yet made up its mind as to the best method of handling wheat. I would suggest that the Government has passed from the stage of being unwillingly forced into a state monopoly to the stage of prolonging the monopoly for experimental purposes. Unfortunately, unlike in the physical sciences, in economics we cannot view simultaneously the "check," or alternate system of marketing. This is because there is no true "check" lot. The two systems operating simultaneously give an inaccurate picture of what each one would do in isolation. Certainly, the "check" we see today is not what the "check" would look like if we had no state trading, and state trading we see today would not look like state trading if all competitive free markets were eliminated.

In seeking the cause for the support of the majority of western farmers for state trading in wheat and coarse grain, we have to go back to the conditions of the 1930's and early 1920's. Many farmers knew from bitter experience that the fluctuations of the open market had ruined their life's work. Some of them blamed the open market or the Grain Exchange. The more thoughtful ones realized it was something more fundamental than just the open market. But regardless of whom they blamed, both groups sought protection of their life savings. From long years of experience they knew that the only protection they could rely upon was the willingness of the Government to stand behind them in case of a national emergency.

There is no doubt that the Wheat Board was created to protect the wheat producer against the possibility of unduly low wheat prices. The same may be said for the compulsory marketing of coarse grains through the Wheat Board.

Nobody has ever provided any proof that under identically the same conditions, state selling of grain will net the farmer more money over time than the open market, or that a Government Wheat Board is any more efficient than private grain dealers. But the private trade cannot protect the grain producers against violent price fluctuations; only the financial power of the Government can do this. At the present time the Government is using a state trading grain monopoly to provide the desired protection. This is not the only method that could be used to protect the farmer.

As in grain marketing, Canada's venture into state trading in animal products was pretty well forced upon her by the pressure of events. The political philosophy of the British Labour Government favours the importation of food by a government monopoly. This fact, plus the desire of the British Food Ministry to make bulk purchase food agreements in order to guarantee food supplies during the war, influenced the Canadian Government in setting up its various state trading agencies during the war to handle the food exports.

As long as the prices in each contract were raised and costs were held down in Canada, the advocates of state trading and bulk purchase in farm products had a field day. But when the new contracts were made at lower prices or at stable prices with rising domestic costs, a period of disillusionment set in.

Dr. Burton has hinted at the difficulties and possible frictions which arise when intergovernmental food contracts are being negotiated. In the closing years of our food contracts with Britain we have certainly experienced plenty of difficulties, in spite of official denials to the contrary. Our negotiations on quantities and prices for hogs and cheese have gone on for months in an attempt to arrive at a price fair to producer and consumer alike. When the negotiations finally ended there were no contracts. Argentina, Denmark, and even New Zealand have had somewhat similar experiences.

Canada's experience with intergovernmental bulk selling to Britain would appear to have been reasonably satisfactory during periods of rising prices and practically complete government control. But in the postwar period of relatively uncertain price levels and freedom from controls, the experience has been much less satisfactory.

Mr. Perkin has indicated the significant difference between the operation of Producer Marketing Boards in British Columbia and Ontario. In British Columbia the Boards actually control and direct the flow as well as regulate prices of the product. In Ontario the marketing schemes set up do not provide for the control handling of the product except in the case of cheese. These schemes are primarily concerned with seasonal price negotiations with processors and commercial distributors of specific farm products.

They have worked satisfactorily in Ontario because they are pretty well confined to products that are grown only in that Province, or at least the major commercial area of production is in Ontario.

The stumbling block in any provincial legislation is the fact that the product is produced in a number of provinces. For instance, the negotiators for the Ontario Hog Marketing Scheme soon found that they could not make any satisfactory minimum price agreement with the Ontario Packers because hogs were produced, sold, and slaughtered in all provinces.

As Mr. Perkin has pointed out, where a product crosses the international border or interprovincial boundaries, it requires federal legislation for control. Federal Bill 82 provides the necessary legislation for Provincial Boards to coordinate their efforts.

Mr. Perkin has outlined the recent development in cheese marketing in Ontario. As he has pointed out, it is the first time that dairy producers have dealt directly with the British Food Ministry in a bulk purchase agreement. The Producer Apple Marketing Boards of British Columbia and Nova Scotia made agreements directly with the British Food Ministry in 1949 and 1950.

I believe Canadian farmers are going to swing more and more in the direction of self-help. They are not going to swing more in the direction of state trading—they are going to move away from it.

The recent experience of the apple producers and the cheese producers of Ontario are straws in the wind. This thought was expressed by Dr. H. H. Hannam, President of the Canadian Federation of Agriculture, when speaking at the annual meeting of the Federation in Calgary last January, he said:

"I should not be surprised if the next major development along this line will be for organized producers in Canada to negotiate their own export sales and

sales agreements. This is in line with the basic philosophy of the farm movement, which has always given emphasis to self-help procedures, and is likely to be more permanently successful than depending wholly on government assistance programs, although the latter have their place and are absolutely essential under certain conditions. What I am suggesting here is already being done by some producers elsewhere. For example, Danish farm organizations negotiate their own bacon contracts with the United Kingdom Ministry of Food."

MARKETING ROUNDTABLE—FRUITS AND VEGETABLES

Chairman: H. G. Hamilton, University of Florida

AN APPRAISAL OF CURRENT ECONOMIC RESEARCH IN FRUIT AND VEGETABLE MARKETING

BENNETT S. WHITE, JR., AND D. B. DELOACH
Bureau of Agricultural Economics

WE HAVE been asked to make an appraisal of fruit and vegetable marketing research. Our treatment of this subject may be broader than you would wish and may overlap some of the papers presented on other programs during these meetings. This will be the case because the principles which underlie successful work on fruits and vegetables are to a considerable extent parallel to those which pertain to marketing research in general. We shall use work under way or recently completed in the Bureau of Agricultural Economics, and work in other parts of the United States Department of Agriculture and in the State Agricultural Experiment Stations with which we have had frequent contacts, to illustrate the points we have in mind.

It is our belief that many workers in the field of agricultural marketing do not consider their field of research to have had a very distinguished history. They believe that research done by public agencies has made only limited contributions. It is known that great opportunities exist for improvements in the marketing system, but the basis for dissatisfaction lies in the defining of significant problems and the adapting of research methods to their solution.

It has been pointed out many times before that in certain periods a number of research workers cease their efforts in the marketing field, and popular support is withdrawn from the search for a goal which seems either to be unobtainable or to be not worth-while in relation to the alternatives which are available. The fear of declining farm prices was a potent factor contributing to the passage of the Research and Marketing Act of 1946 and the resulting increased support in the last few years for research in the marketing field. Producers and legislators, particularly, believed that distribution could be made more efficient through better handling to maintain quality, develop new products, and promote orderly marketing; and that these developments might be expected to be the products of research and would provide alternatives to the traditional notion that surpluses should be forestalled by production and marketing controls. In other words, the program would be to balance demand and

supply through intelligent and positive actions for expanding the market for farm products.

The historical unevenness of public and farmer interest and support for marketing studies, and the resulting frustration of research workers raise the question as to what changes are needed to do a better job in developing a basic core of marketing research which will be of continuing interest and value to the community.

Principal Problem Areas

It would seem that marketing research on fruits and vegetables, and for that matter in any field, can be expected to result in a useful product to the extent that two main conditions are met: (1) the project or program must be aimed at a significant marketing problem which can be appropriately studied by the economist and statistician; and (2) sufficient resources, properly organized and directed, must be devoted to carrying out the work.

Perhaps a way of stating the principal problem areas is to ask ourselves, "What information can be put into the hands of producers, marketing agencies, and consumers which will provide them with a basis for increasing marketing efficiency?" Professor Kimmel will treat this subject more fully, so we will sketch the field briefly.

First, persons engaged in producing and marketing need reliable data on marketing conditions, completely and honestly interpreted. Without such information, prices in the different markets and as among the various grades and qualities offered for sale cannot be effectively adjusted, and producers and marketing firms are gravely handicapped as far as knowing what to produce, and where, when, and how it should be sold.

Second, the different groups involved in marketing farm products, particularly the producers, need information regarding the relative efficiency of marketing by different methods and through the various channels. These studies should include a consideration of losses from waste and spoilage, and they should be carried through to a point where they provide a measurement of effects on market prices, returns to producers, and qualities and services provided to consumers. The place of the marketing economist in this field is well established and the tools of research available to him are adapted to such tasks. This field of work may be illustrated by the simple problem of whether southern tomatoes should be shipped to market in field boxes, in lugs, or by some other method. Should a shipper continue to employ rail, or should he shift to trucks as a means of moving his products to market? What have been the recent effects and what are the likely implications for commercial

citrus growers of the revolution which has taken place during the past decade in the utilization and methods of marketing citrus fruits?

Third, the marketing system needs data on the comparative costs of performing marketing functions by different types of firms at each of the steps of the marketing process. A study of the factors responsible for these differences in cost provides the key to marketing efficiency. Such studies may be confined wholly or largely to an audit or accounting approach, or they may be of a more complex nature involving the joint efforts of economists and engineers. In the latter case, each phase of the operations of the firm is studied carefully in terms of physical inputs and outputs. These then are translated into monetary terms to provide a measure of economies and dis-economies resulting from the scale of operations, organization, and methods and practices employed in performing the function under study. The results of such analyses should provide a basis whereby the less efficient firms may emulate the more efficient, or may strive to make their operations conform more closely to those of a model plant if the development of such a model, either actual or hypothetical, is a part of the study.

Fourth, there is a general line of work involving the competitive position of fruit and vegetable growers. This category may be broken down into two sub-categories, of which the first is the study of competition among the various fruit and vegetable products for the consumer's dollar. In a sense, of course, all products are more or less competing for the consumer's dollar. Some are so closely competitive, however, that they tend to be substituted extensively one for the other in response to changes in relative prices, changes in quality, shifts in consumer taste, and developments in the technology of processing and handling. In this connection we have only to mention the change in the relative position of citrus and deciduous fruits during the last few decades and the current pressing questions in both the citrus and apple industries concerning how to process and market products in such a way as to bring a maximum expansion in total consumption through a minimum displacement of the fresh by the processed product.

The second category in the field of competition relates to interregional competition among producers of the same product as influenced by both production and marketing factors. Some regions and subregions are growing more rapidly in population than are others. For instance, the West Coast tends to find a larger market for some of its fruits, vegetables, cattle, sheep, and dairy and poultry products among its rapidly growing urban population. The South is becoming industrialized. Transportation costs have increased markedly in recent years and trucks continue to grow in importance. Marketing technology is changing. Irrigation and

reclamation projects are opening new areas of agricultural production. All of these things require that an appraisal be made from time to time of the position of a region in the market, and some guide lines need to be laid down with respect to adjustments which producers and marketing agencies may be called upon to make in order to stay in business.

Fifth, is that area of research which studies marketing institutions and organizations, tremendously important considerations in fruit and vegetable marketing. It includes the analysis of market channels, structure and organization, with emphasis on the way the market operates in the making of prices. It stresses research into managerial efficiency and the factors back of managerial decisions. Why does the business man buy or sell as he does? Why and how does he respond to prices and other market influences? Why are resources used in marketing allocated as they are and what is needed to bring them closer to the optimum? Inasmuch as marketing services, channels, structure and organization are affected materially by governmental and trade regulation, these regulatory forces are basic considerations in any study.

The foregoing type of research requires (1) a complete and intimate knowledge of the characteristics of the commodities involved and of the business organizations which handle them, (2) an insight into factors affecting managerial efficiency, the presence or absence of competition, and other aspects of price determination, and (3) the complete cooperation of business firms that are the subject of study. It is not necessary to relate to a group of research people the nature and extent of the difficulties which may be encountered.

Time has permitted only the most sketchy outline of what we believe to be the significant areas of research in fruit and vegetable marketing. We feel, however, that these lines of work should provide the basis for a research program which would be of expanding interest and value. One of our principal reasons for believing this is that they are based on needs which will continue to arise as long as the American economy is featured by constant development and change. It is the business of research people to analyze the implications of changes under way, to forecast those which are in prospect, and to provide farmers and business men with knowledge which will enable them to adjust quickly and efficiently to a dynamic situation.

Some Examples of Current Research

Time does not permit us to examine even a limited number of individual projects for the purpose of pointing out where they have succeeded and where they have fallen short. We should be able to do this individually by taking each study and asking whether it has produced definitive results which can be used by farmers, marketing agencies, or consumers to improve the marketing of agricultural products.

Much worth-while work has been and is being done in the marketing of fruits and vegetables. It is probably fair to say that the outlook and situation work and the market reporting activities of both the state and federal agencies have been extended in scope and improved in accuracy over the years. It should be added, however, that the provision for marketing information to distributors and consumers is far behind the work with producers.

Certain Agricultural Experiment Stations and the Bureau of Agricultural Economics have cooperated in obtaining information on marketing charges and services rendered at the different levels of trade for major produce items in specified cities. For example, such information has been obtained for samples of retail stores in Denver, Pittsburgh, Cleveland, and in Charlotte, North Carolina. We have cooperated with the California Station in collecting and analyzing information on channels used, margins taken, and services rendered in handling California grown fruits and vegetables marketed within the State. While such studies are of limited usefulness in contributing directly to improvements in the marketing process, they do show which functions and stages are the most important contributors to total marketing costs and thus provide guides for further research. In addition, they have a broad educational value in that they correct many serious misconceptions in the minds of farmers, legislators, and others.

Studies dealing with the efficiency of alternative channels include a cooperative project between the Bureau and the South Carolina Agricultural Experiment Station dealing with marketing methods employed, charges made, services rendered, and waste and spoilage involved in connection with sample shipments of South Carolina tomatoes to Jacksonville, Florida. Some progress has been made in analyzing factors responsible for differences in costs and efficiency among marketing firms. The states have made a number of studies. Those of you who are interested in citrus know of the work which the Farm Credit Administration and the States of California, Texas, and Florida have been doing on fresh fruit packing houses and more recently on processing plants. During the past year the Bureau of Agriculture Economics has been cooperating with California in a major study on the costs and efficiency of packing apples and pears. Both the economists and engineers are working on a job which involves a detailed collection of data on physical inputs and outputs, including costs of specific packing plant operations under various conditions. In the current year this type of study is being extended to include the grape industry. Special emphasis is being placed on means of conserving manpower.

Some good work has been done relating to competition among the various fruits and vegetables. Most of you have seen the monthly and quarterly mimeographed reports published by the Department of Agriculture

which carry information on consumer purchases, prices paid, retail outlets through which purchases are made, and other data on citrus in its various forms, other fruit juices and dried fruits. At the present time we are organizing a study in cooperation with Florida, the objectives of which will include an effort to throw light on competitive relationships between Florida citrus in fresh and processed forms and other juices, and to develop a pattern of marketings for Florida citrus which, under various assumptions, could be expected to maximize returns to growers while moving larger crops into consumption.

Marketing Research Can Be More Useful

We have attempted to convey two basic thoughts in the preceding discussion; namely, (1) that there are specific areas of marketing research to which the tools of the marketing economists can be adapted and from which reasonable results can be expected, and (2) the major contributions of research to improvements in the marketing of farm products will arise from a study of the efficiency of resource use in the marketing of agricultural commodities. In planning new studies, therefore, we believe that major attention should be given to those two factors. We believe that research can be carried out successfully in several areas, including the following: (1) Effective pricing of farm products at all levels of the marketing structure is one means of improving the movement of farm commodities into the hands of consumers, and at the same time, of maximizing the use of available market facilities. This is a fertile field of study for marketing economists, and much can be learned from it that will prove beneficial to all groups engaged in agricultural production and marketing. In studying prices, attention should be given to the impact of quality and area competition on the price structure and the resulting effects of price competition on the marketing firm, industry, and the farmer. (2) Studies involving the efficiency of the operation of individual marketing firms and the marketing system can be carried on effectively. In order to deal satisfactorily with firm and industry efficiency, the economists must give adequate attention to the manner in which specific operations within the organization are performed and the extent to which improvements can be effected. This type of research may require the services of the business analyst and the efficiency engineer. (3) It is possible that one marketing channel might provide a more effective system of distribution than another. The extent to which alternative channels should be used is of considerable importance and is another area in which economic investigations can be carried out satisfactorily. (4) The operation of the pricing mechanism and the efficiency with which specific functions within the firm and the efficiency with which the firm and industry operate are contingent on many institutional factors. These

determine the structure and organization of the market and the extent to which improvements in marketing efficiency are possible.

Problems of Organization and Operation

More careful planning and more clearly defined responsibility for leadership are points which can hardly be overemphasized. In the Bureau we have had experiences in cooperating with regional groups and we have worked with several experiment stations on projects which were bilateral in nature. We feel that there has been a rather close correlation between the care used in planning and the definiteness of assignment of responsibility, on the one hand, and the success of the project on the other.

In closing, we cannot refrain from making a few observations with respect to special problems which characterize regional projects. On some of these projects we have suffered from the lack of planning. We believe that one of the first jobs of any regional committee should be to develop a program of research needs for the commodity in the region, and a selection of those problems which are both important from a regional point of view and are adapted to attack on a regional basis. There should then be an assignment of priorities, and when one problem has been adequately dealt with, the research group should pass on to the next on the list. Of course, we do not mean to imply that a research program can be developed and remain unchanged for a long period of years. There must be continual modification and adaptation to changing conditions. However, if we had in each case a set of guide-lines and bench-marks, we could avoid, or at least minimize, the discouraging experiences which we have all too often at regional meetings in which there is a random discussion of a number of points which happen to be at the moment in the minds of those in attendance, and finally after a day or more of rather fruitless deliberation, one or more lines of work are settled upon largely as a means of bringing the meeting to a close.

The problem of leadership is also crucial. There are many cases in which a study can best be carried forward by one state working on behalf of the region. If two or more states divide responsibility for the project, the chairman of the technical committee and the coordinator (if one is employed for the project) need to put forth considerable pains to see that each state understands and accepts its responsibility and carries forward its part of the work in a manner and on a time schedule which are in accordance with plans. This leads to the matter of the attitude of the state with respect to the priority to be given to regional work relative to state work.

The Experiment Stations feel a heavy responsibility to undertake work which will be particularly useful to and will meet the approval of people in their respective states. On the whole this is entirely right and proper,

for the Agricultural Experiment Stations are primarily state institutions, not regional or federal. It should be remembered, however, that the agricultural producers of most states have important markets outside their borders. Certainly this is the case with respect to fruits and vegetables. If the Stations are going to do *marketing* research, they often will need to work far beyond their own borders. Cooperation with other states and federal agencies should provide better results at less cost than can be expected from a policy of "go it alone." Officials in the Experimental Stations are naturally and properly interested in obtaining funds which are allocated for participation in regional studies. However, when it comes to utilizing the time and skills of their research staffs, priority tends to be given to state projects, and work on the regional study is in danger of becoming something of an orphan or stepchild. Obviously, this tends to delay progress and to throw a disproportionate amount of work on the coordinator, if one is employed. All of us, state and federal people alike, know what it means to have insufficient personnel to carry on all of the lines of work we would like to pursue. However, we must find a way to assign adequate resources to regional work, if the program of regional marketing research is to realize the great possibilities which it inherently possesses.

In closing, we should like to return to the theme emphasized earlier in this talk. Marketing research is needed primarily to point the way to a better marketing system in an economy featured by continual change. Any public research agency that fails to set its sights on the future, as well as the present, does not merit public support.

THE OBJECTIVES OF FRUIT AND VEGETABLE MARKETING RESEARCH: A BEGINNER'S VIEW

D. C. KIMMEL*
University of Florida

A CLEAR statement of objectives is a prime need in the conduct of research in any field. This paper represents the attempt of a beginning worker to clarify in his own mind just what the long-run social and more immediate economic objectives of fruit and vegetable marketing research are, and to determine what is involved in attaining them.

The objectives of fruit and vegetable marketing research must be established within the framework of the over-all social goals of the Nation. One general statement of these goals, that has much economic content, appears in the Employment Act of 1946, which declares that it is the policy and responsibility of the Federal Government to promote maximum employment, production, and purchasing power, and to do so in a manner calculated to foster and promote free competitive enterprise and the general welfare.[1] Clearly this statement involves ethical, political, and economic considerations. It becomes a frame of reference for economic analysis, since it can be attained only if scarce resources are efficiently applied to the satisfaction of the total array of human wants.[2]

After four years of operation under the generous financial support provided by the Research and Marketing Act of 1946, it may be well for agricultural marketing research workers to re-examine the objectives of their work for the purpose of ascertaining whether they are compatible with (1) the broad social and economic goals such as outlined in the Employment Act of 1946, and (2) the social responsibility implied by the generous financial support of the Research and Marketing Act. Are such goals as increasing the farmer's share of the consumer's dollar, increasing net farm income, increasing consumption of farm products, or maintaining farm prices at high levels, suitable goals for guiding our research?[3] Do we have an objective measure which indicates that

* The writer wishes to acknowledge his appreciation to Professors W. K. McPherson, H. G. Hamilton, and M. R. Godwin for their many helpful suggestions in the preparation of this paper.

[1] Public Law 304, The Employment Act of 1946, Seventy-ninth Congress, Second Session, February 20, 1946. See Section 2, Declaration of Policy.

[2] For one thoroughgoing exposition of the role of economics in society, see Howard L. Ellis, "The Economic Way of Thinking," *The American Economic Review*, XL (March 1950), p. 1.

[3] These are the objectives expounded by various agricultural pressure groups, their spokesmen in Congress, and a few economists. For a discussion of the desirability

farmers are not receiving their fair share of the consumer's dollar? What is "fair"? Is there any reason to believe that farm incomes in general are more in need of raising than the incomes of members of certain other sectors of the economy? Should persons be asked to consume more of a commodity of which they already have all they desire, or which nutritionists say is already in plentiful supply in the diet?

It may be argued that the goals enumerated, such as increasing net farm incomes and maintaining farm prices at high levels, are those implied in the Research and Marketing Act.[4] Nevertheless, it is the opinion of the writer that research must be constantly oriented toward achievement of the goals of society as a whole—that only in such manner can facts be provided which might aid in framing future legislation in the public interest. There may be, and undoubtedly are, specific instances where one or several of these goals may be socially desirable; but they cannot be blindly accepted as across-the-board guides for marketing research. When setting up research programs and projects, it is necessary to consider how each individual commodity can contribute to the attainment of the broad policy objectives.

What then, should be the broad objective of fruit and vegetable marketing research? Within the framework established by broad social goals and the role of economic activity in contributing to those goals, the objective of fruit and vegetable marketing research may be stated in general terms "to provide information which will promote maximum consumer satisfaction through direction of resources to the production of the desired kinds and quantities of fruits and vegetables, and through facilitating most efficient transfer of these fruits and vegetables from farmer to consumer." If fruit and vegetable marketing research is to serve a useful function it must supply either information, or the procedures for obtaining information, that can be used as the basis for action in achieving this objective.

The remainder of this paper will be devoted to a consideration of how fruit and vegetable marketing research in three economic problem

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of goals such as these, see Goeffrey Shepherd, "The Field of Agricultural Marketing Research: Objectives, Definition, Content, Criteria," *this Journal*, XXI (August 1949), pp. 444-46. For a welfare economic evaluation of alternative ways of accomplishing one of these goals—increasing farm income, see O. H. Brownlee, "Marketing Research and Welfare Economics," *this Journal*, XXX (February 1948), pp. 55-68.

[4] For examples of such interpretation, but not necessarily acceptance of the goals, see O. V. Wells' statement on the scope and objectives of marketing research, USDA, ARA, "Market Research Notes From National Workshop," University of Minnesota, Minneapolis, Minn., Aug. 29-Sept. 8, 1949, p. 18 (mimeographed); John D. Black, "Guideposts in the Development of a Marketing Program," (Paper presented at the Marketing Conference of the Massachusetts Agricultural Program Board, Littauer Center, Harvard University, Cambridge, Mass., Feb. 25, 1947), p. 13 (mimeographed).

areas—demand, physical efficiency in marketing, and the operation of the pricing mechanism—can contribute to maximizing the satisfaction of wants.

Demand

The first problem area to be discussed is demand. Demand information is necessary in guiding production and in facilitating efficient distribution of commodities in time and space. Inclusion of the function of guiding production gives recognition to the view that the marketing problem involves not only processors and handlers, but goes all the way back to the producer. If the nature of demand is truly reflected in price and the information passed back through handlers and processors to the farmer, these entrepreneurs theoretically should be in a position to direct resources to the production of the kinds of commodities consumers actually want, and thus avoid so-called "surpluses." The goal of promoting maximum satisfaction of consumer wants cannot be furthered by ignoring those wants. Actually, to the extent scarce resources are diverted from the production and marketing of the commodities consumers want, to the production of commodities that farmers grow merely because they have grown them in the past, attainment of this goal is defeated rather than facilitated. The real function of marketing research is to provide information which can be used in preventing such socially undesirable results.

To aid in guiding production, farmers and processors need information that will enable them to predict what the market[5] will be under varying sets of circumstances. For purposes of prediction, relationships between quantities consumed and the various factors affecting consumption must be developed. The ideal information would consist of price-quantity relationships and the way in which these relationships are influenced by the several factors determining the level of demand. Since no simple means of presenting multiple-factor relationships has yet been developed, research workers have been largely content to work with single-factor relationships.

The single-factor relationship given most attention has been that of price-quantity. Through the use of national aggregate time-series data on commodity disappearance in combination with various kinds of price series, so-called demand schedules have been developed.[6] Most of these relationships might be more correctly termed supply-price relationships. In effect they tell producers "if the total supply is such and such, the

[5] "Market" is used here to indicate total potential sales of a commodity in all its forms and through all market channels.

[6] For examples of this type of "demand" schedule for oranges, peaches, and apricots, see Goeffrey Shepherd, *Agricultural Price Analysis*, Iowa State College Press, 1941, p. 299. This note is not meant to imply that such schedules are not useful, but only that they are not the most useful type for purposes discussed here.

average price will be such and such." But in using price as a factor in predicting the total market, what we need to know is, "given specified prices, what will be the corresponding consumption of each of the several consumer goods made from a single agricultural commodity?"[7] Obviously the size and character of the potential market as determined by this method may be quite different from that revealed by supply-price relationships. It is the opinion of the writer that, despite the employment of excellent statistical techniques, it will be difficult to develop, from available national aggregate time-series data, relationships which will be really useful in reflecting the effect of price on consumption. The national or total market picture will probably have to be developed through data obtained from a combination of studies of particular products at the level where consumer and product meet—the retail level. Only at that level does there appear to be a possibility of developing a demand schedule, of actually isolating the price-quantity relationship and ascertaining the consumer's true reaction to price.

An approach that might be tried in attempting to develop a price-quantity relationship—one that would be useful both in predicting the total market and in predicting short-run fluctuations in volume at the retail level—would consist of a combination of consumer surveys and controlled experiments in retail stores. Controls in the retail store would serve to eliminate or minimize the influence of factors, other than the price of the given product, which influence sales within the store. The stores would need to be carefully selected in order to obtain homogeneous trade groups with respect to income, race, and other factors. The consumer survey would be used as a basis for clearly describing the trade group, and in ascertaining the influence of price change on actual consumption. The approach suggested here is only an idea and is intended primarily to point up the need to seek new approaches to the derivation of demand schedules which actually reflect reaction to price change.

Even if the attempt to develop a price-quantity relationship is successful, there is a need to give considerably more attention to the influence on consumption of the non-price factors which are the determinants of the level of demand. The removal of the disturbing non-price elements through satistical manipulation or employment of sampling techniques, does not provide for employment of these non-price elements in the prediction process. A more positive approach, that of careful study and development of relationships between these other factors and consumption, is necessary.

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[7] For example, the commodity is oranges; the consumer goods are fresh oranges, frozen orange concentrate, single-strength canned juice, orangeade, and various minor products.

The relationship between income and consumption is one determinant of the level of demand which might well receive more attention as a device for predicting the total market for a commodity. This relationship might be developed in the most meaningful form through consumer studies which obtain data on income and consumption of specific products. There are procedural difficulties in developing this relationship, but work done to date indicates that useful results may be obtained, and that income is an important factor in determining the level of consumption of fruits and vegetables.[8]

Another factor influencing the level of demand, and useful in predicting the total market for a commodity and for individual products, is that of taste or preference. Consumer tastes and preferences are constantly changing and not subject to objective measurement. The nature of these preferences and tastes at a given time can be determined through various types of consumer studies and controlled experiments in retail stores. A series of studies over a period of time may indicate trends which will be useful in prediction.[9]

A third factor that deserves increased consideration is that of the price of related products. How do prices of possible substitute products affect sales of a given product?[10] These substitute products include the various forms of a given commodity—as for example, fresh, frozen, and canned spinach—as well as possible outside competitors, such as turnip greens and endive. The definite need in studying substitution is for development of procedures. Some modification of the approach suggested for developing price-quantity relationships might be a possibility in obtaining the needed information.

The influence on consumption of various government programs is a fourth factor to be considered in predicting the total market. There is a

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[8] See compilations made from 1935-36 and 1942 studies of consumer purchases, also discussion of methods and computations, USDA, Bureau of Agricultural Economics, *Consumption of Food in the United States, 1909-48*, Misc. Pub. No. 691, August 1949. See also, various reports and summaries based on the 1948-49 food consumption surveys, and especially *Fruit Selections of City Families*, Commodity Summary No. 9, May 1950, pp. 5-9, and *Vegetable Selections of City Families*, Commodity Summary No. 10, June 1950, pp. 6-8—both USDA, ARA, BHNHE, Washington, D.C.

[9] The monthly releases of BAE and the Fruit and Vegetable Branch of PMA compiled from Industrial Surveys data, *Consumer Purchases of Selected Fresh Fruits, Canned and Frozen Juices, and Dried Fruits*, are useful in this connection. But to be of real value in predicting, these data should be accompanied by information explaining why the trends are occurring.

[10] It should be clearly recognized that price is only one of a number of factors affecting substitution. A better knowledge of consumer buying behavior is essential in understanding the phenomenon of substitution. Some work now being done by the writer indicates that in the case of substitution among various forms of orange juice, price may be of minor importance; and that the "desire for a change" is an important motivator in causing shifts from one form to another.

need to know just what effect the current price support and marketing agreement programs may have on total consumption of a commodity. Further, it may be desirable to evaluate various alternative methods of achieving price support to provide the basis for determining which methods contribute most, or detract least, from the maximization of consumer satisfactions. While it is not the function of research in fruit and vegetable marketing to dictate policy, it is the function of such research to provide the basis for the economic evaluation of proposed policies and programs.

More accurate information on the forces that influence consumer demand can be useful in facilitating efficient distribution of commodities in space and time. Efficient distribution in space necessitates a knowledge of variations in consumption among geographic areas.[11] Within geographic areas, a knowledge of consumer characteristics such as race, income, nationality, family composition, occupation, and education, associated with the desire for particular commodities, will aid in achieving efficient distribution.

Provision for efficient distribution in time involves research which will give some indication of the amounts of a commodity the market can absorb at a given time. This type of information is needed by private production and marketing groups, and governmental agencies concerned with the operation of marketing agreements, in providing for an orderly flow of fruits and vegetables to the market. A more detailed knowledge of the seasonal variation in consumption could be used to increase the efficiency of distribution, processing, and production.

Physical Efficiency in Marketing

The second major problem area to be discussed is that of determining the most efficient methods and organizations for effecting physical transfer of the desired fruits and vegetables from farmer to consumer.[12] Farmers, consumers, and marketing men are rather generally agreed that promotion of increased physical efficiency in marketing is a desirable goal. Under conditions of perfect competition they could, in the long run, expect to share the product of this increased efficiency. Whether or not such sharing actually takes place and the relative size of the shares, under existing conditions of competition, are dependent upon the nature of the monopolistic elements or other market imperfections present. Con-

[11] For examples of the kind of information needed on geographical and seasonal variation, see *Fruit Selections of City Families*, op. cit., pp. 10-17; and *Vegetable Selections of City Families*, op. cit., pp. 10-15.

[12] For a general outline and discussion of research problems and procedures in the study of marketing efficiency, see John D. Black and Neil T. Huston, *Research in Resource-Use Efficiency in the Marketing of Farm Products*, Harvard Studies in the Marketing of Farm Products, Number 1-H, June 1950.

cern here, however, is not with the distribution of the product of increased physical efficiency, but with the methods of bringing about such increased efficiency.

Research directed toward laying a basis for increasing physical efficiency in marketing processes must be directed toward reducing inputs relative to given outputs. In many instances, this will involve increasing the services or improving the quality with the same or relatively smaller increases in inputs. Studies designed to increase efficiency in physical handling should tell the marketing agency "how"—not just "what." Many of the studies purporting to contribute to increased physical efficiency merely report—"The average cost of packing a crate of celery is $1.10; your cost is $1.25."[13] The implication is "your costs are out of line; do something about them." But these studies rarely indicate to the grower or packer just what steps he must take to get into line. The reason for the failure is that the method employed just does not yield results that can be used as a basis for action. Information presented in such studies is "interesting"; but if the efficiency of marketing is to be improved, results of research must be something more than interesting. They must state specifically what steps existing organizations can take to bring about the desired efficiency; or they must indicate what types of new organizations can accomplish the desired ends.

The budget or synthetic approach is a promising device for obtaining data needed to improve the efficiency of the individual firm.[14] Through the study of existing operations, time and motion studies, consultation with architects, engineers, and other specialists, an ideal plant and mode of operation are designed. This model or ideal is then used as a basis for checking the efficiency of existing operations and plants, or for constructing new facilities. Another type of budget analysis, which is somewhat simpler, consists of determining the physical inputs and outputs of a given firm and then testing the effects of a specified change on the total input-output relationship. Studies of this type have a much greater potential value in contributing to increased operational efficiency than do the usual cost studies.

Studies of horizontal integration of functions or firms are needed in determining the possibilities for increasing efficiency at a given level of the marketing system.[15] For example, there are a number of small citrus

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[13] A hypothetical case.

[14] For an application of this approach, see W. F. Henry, R. G. Bressler, Jr., and G. E. Frick, *Economies of Scale in Pasteurizing and Bottling Plants*, Storrs Agr. Expt. Sta. Bul. 259 (1948).

[15] For an example of one approach to the study of efficiency of a marketing function, see R. G. Bressler, Jr., and D. O. Hammerberg, *Economies of the Assembly of Milk*, Storrs Agr. Expt. Sta. Bul. 239 (1942).

packing-houses in an area operating absolutely independently of each other. Would efficiency of operation be increased if these packing-houses were to form some type of cooperative organization for performing certain operations jointly; or would complete horizontal integration be the most efficient form of operation? Comparisons will need to be made of the physical inputs required for handling the total crop in the area under the present system and under varying degrees of integration. The findings of this type of research could form the basis for a more efficient organization of firms at a given level in the distribution system.

The final step in the analysis of the physical efficiency of marketing operations for a given commodity is the evaluation of the efficiency of operation of the whole system. The question is simple, "What is the most efficient way of moving a box of tomatoes from the grower in Texas to the consumer in New York?" Although the question is simple, obtaining an answer will involve the refinement of existing research techniques and methods, and the development of new ones. The phenomenon of vertical integration[16] comes up for prominent consideration at this stage of the analysis. A start at answering the question might be made through the study and comparison of the operations of an existing integrated concern, a series of nonintegrated firms, and a synthetic model of a vertically integrated concern embracing the most efficient mode of operation at each level of the marketing system. It is recognized that all sorts of difficulties are involved in trying to obtain answers to this type of question; but it is the type of question that must be answered, if various industry and government decisions are to be based on fact rather than hunch or opinion.

The Operation of the Pricing Mechanism

The third and final problem area to be considered is that of determining the effectiveness of the pricing mechanism in facilitating efficient transfer of commodities from farmer to consumer.[17] The role of the pricing mechanism is to affix price tags, at various stages of the marketing process, which accurately reflect demand and costs incurred. Many people are convinced there are too many impediments to the ideal operation of the pricing mechanism. Among farmers there is the feeling that prices they receive are too low; among consumers, that prices they pay are too high. Always, there is the implication that someone in between is taking too big a cut—that someone has the power, and is establishing prices which are

[16] John D. Black emphasizes the need for integration in his "Guideposts in the Development of a Marketing Program," op. cit., pp. 18-22.

[17] This is a little explored field. For a statement of research needs by a pioneer in this field, see William H. Nicholls, "Reorientation of Agricultural Marketing and Price Research," *this Journal* XXX (February 1948), 43-54.

not in accord with demand and cost conditions. The fact of the case is that we have very little in the way of objective criteria for determining whether prices established by marketing organizations are, or are not, socially equitable.

If the goal of maximum satisfaction of consumer wants through efficient utilization of resources is to be approached in a comparatively free economy, a great deal of reliance must be placed on effecitve operation of the pricing system. The criterion commonly used for judging the effectiveness of the pricing mechanism is the concept of the perfect market of theory.[18] Several questions need to be answered by research in this field. Are prices for a commodity identical throughout the market after adjustments are made for differences in time, form, and place? If prices are divergent, what are the marketing imperfections responsible for this divergence? Determination of the existence of market imperfections and consquent divergence from results expected in the free market are not, however, sufficient grounds for condemning the pricing mechanism. At least, one further question remains to be answered. Would the perfect market provide a larger total product and more equitable distribution among producers, marketing groups, and consumers; and if not, what are the acceptable alternatives?

At least three steps are involved in the study of the pricing mechanism. A first step is that of gaining an understanding of just how prices are established at various levels of the marketing system. For example, how does the chain store buyer in Lakeland, Florida, decide what he will offer for a box of oranges on October 1; or how does Florida Citrus Mutual decide what the minimum acceptable price to growers shall be on that date? There will be no direct answers to such questions, but careful observation and work in the industry should yield some qualitative information that will serve as a basis for further research. This preliminary study should indicate the presence or absence of market imperfections which are, or have the potentiality for, obstructing the attainment of our social goals. Where market imperfections are found, the second step is to design studies for determining the influence of the various imperfections on the establishment of prices. The final step in the process is the comparison of the results obtained under existing conditions with those which might be obtained under possible alternative conditions of competition. Results of research in the field of pricing mechanisms, when coupled with the results of studies of physical efficiency in marketing, will serve to enlighten the public, and should serve as the basis for more desirable public policy.

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[18] For a discussion of the perfect market, see Geoffrey Shepherd, op. cit., pp. 28-41.

DISCUSSION

J. K. SAMUELS
Farm Credit Administration

In introducing the principal problem areas in fruit and vegetable marketing research, Dr. White set forth two conditions that must be met in order to realize useful results. One is to have available sufficient resources, which I interpret as adequate manpower. Most departments operate within a rather fixed budget and may even have definite time limitations with respect to certain projects or lines of work. Under these circumstances it is essential to gear production to resources or capital, in order to come up with a finished product that is not obsolete. We have an obligation to determine in advance that our resources are sufficient to carry through a job from start to finish.

The other point was that a project must be aimed at a significant marketing problem. In general, I believe our research is directed toward specific problems, perhaps not always significant. I am sure Dr. White had in mind a broad interpretation of the work "problem." However, I would like to raise the question as to whether we should limit our efforts to problem solving. It seems to imply some lack of originality. Should we as marketing economists admit that originality is only in the province of the physical sciences?

In regard to analysis of the market structure and organization as a means of benefiting marketing groups, it is necessary to know more about just how a price is established, the comparative advantages of the buyer and seller at various levels of distribution, and the factors influencing the establishment of a price. However, it is also essential to analyze the market structure from the standpoint of efficiency, utilization of product, and elimination of waste, both in terms of the product itself and the labor and capital used in the distribution of fruit and vegetables. In the past few years we have expanded our market research work in the wholesale market and in retail stores, in the belief that here are fertile fields for lowering costs, shrinking margins, and streamlining operations. With some notable exceptions, the same expansion has not taken place in research at the shipping point level. I think there is a need to take a good look at our local distribution set-up, particularly in producing areas near large consuming centers, to see if it isn't possible to develop a more orderly system of assembly and distribution. In many areas growers are still dependent on the trucker to come around and buy his produce or his fruit. He is bound to a local shipper because that is his only line of credit. He is offered a contract to produce canning vegetables by a representative of a national canning company too often on a take-it-or-leave-it basis. The truck gardener or fruit grower needs information that will assist him in obtaining improved facilities for grading and packing in utilizing seasonal surpluses and off-grade products, and in obtaining credit tailored to his particular needs.

The speaker pointed out that researchers should provide business men with knowledge or information which will enable them to adjust their operations or practices quickly and efficiently in the light of current conditions. In addition, we should be able to furnish Congress and government officials, particularly those administering the so-called action programs, with information as to how these programs are affecting distribution and consumption of fruits and vegetables.

Dr. White indicated four more or less neglected areas of research or areas where additional emphasis is needed. I should like to add a few more to the list.

1. One, just mentioned, is an analysis of the affect of market agreement programs and other direct government activities on distribution.

2. It also seems to me that our research on the possibilities and place of prepackaging in the distribution system has fallen short of the mark. We need to do a more thorough job of evaluating the role of prepackaging in our distribution system.

3. More attention should be given to grades in relation to price. In some instances, products are sold on grade or segregated as to quality at shipping point, and then these quality differentials are lost by the time the product is purchased by the consumer. Other products are sold field-run and then graded by the processor or marketer. We ought to be in a position to supply producers and distributors with usable information on interrelation of grade and price.

DISCUSSION

M. W. FARRELL
Ontario Agricultural College

Research workers in marketing need to consider periodically how their projects fit into the welfare objectives of the nation. There is little social gain if the goals of research are to encourage the transfer of consumer demand from oranges to apples. The national income and efficiency of organization of marketing agencies would not be increased by the application of this type of research. There is a broad gap between the specific detail of a fruit and vegetable marketing research project and the social goals of the nation. For many agricultural economists the consideration of the general welfare is unfamiliar or entirely neglected to the detriment of good working relationships with economists in other fields. Dr. Kimmel has referred to the necessity of internal consistency and harmony of marketing research with both national social goals and economic research. He has pointed to the bridge that should exist, but has given only a few signposts for the guidance of research workers over the gap.

One of the signposts is production to consumer's needs. In a relatively static economy, economic research could pass back to the producers information on consumer tastes and preferences so that uncertainty of production of individual commodities could be greatly reduced. Economic research would be primarily informational to the producers, and could reduce greatly the time-lag between sale by the farmer, and a report back through the price system of how the product was received by the final consumer. In a dynamic rapidly moving economy with competitive products the time-lag becomes increasingly a cause of uncertainty. Market research in this area must be prompt, even if rough and ready in its finish.

The other signpost of consistency with the general interest is efficiency of handling and scale by market agencies. Efficient low-cost operation by marketing agents can be facilitated by the three-fold research attack on demand, physical efficiency in marketing, and flexible, prompt behavior of the pricing system.

Dr. Kimmel emphasizes that it is not a proper goal of research to dispose of

fruits and vegetables that are produced blindly by farmers without regard to the market requirements. This type of research would have us eating, say, more carrots and fewer beans with the increased consumption of one offsetting the loss of others, and with the costs of demand creation thrown in, as a marketing cost. Research into timeliness, market area requirements, and form preferences by contrast, can assist in moving produce from place of abundance to place of scarcity. The derivation of supply-price relationships at retail sets aside value-judgements about market efficiency, and, taken together with marketing margins, does indicate to growers the price-elasticity of demand of the retail customers. But the usefulness of these synthetic demand curves is extended by considering various forms of the product, as well as competing products. The effectiveness of a pattern of retail prices of fresh grapefruit is influenced by the retail prices of canned grapefruit juice, canned grapefruit sections as well as fresh oranges, and even canned apple juice. Retail experience can be enlisted for advice on the immediate competition between products. Controlled experiments through similar retail stores, using a control or check store, offer considerable help in arriving at supply-price relationships. Non-price factors must be recognized if they are significant. Display methods, store neatness, services, packaging are not always logically related to the price variable. Government programs, such as marketing agreements or marketing boards, need to be considered as providing a minimum price or a maximum quantity. As an illustration of market area studies which might facilitate distribution there might be mentioned the sale of Florida grapefruit in New York City, or Ontario rutabagas in St. Louis, Birmingham, or New Orleans.

On the question of physical efficiency in marketing, there can be much optimism. Farming, retailing, and wholesaling have been late in utilizing the work simplification methods and job analyses of manufacturing and transportation. The synthetic approach, sometimes called Taylorism, by intensive study of plant arrangement and of efficiencies of scale, can produce a clear social gain so that a man can turn out a greater volume, and allow a reduction in marketing costs. Making these physical short cuts applicable to the individual handler is a problem of extension and illustration, but the results are likely to be prompt and convincing. On the matter of integration, either horizontal or vertical, we lap over into the final prescription of Dr. Kimmel, the operation of the pricing mechanism. A horizontal integration might allow for centralized marketing strength, or an adequate volume for by-product utilization, while vertical integration might allow for a more interested merchandising of the product—an important aspect if the regular merchandisers are not interested in the width of margin on a product relatively minor to them.

On the operation of the pricing system, allowance must be made for the speed and strength of dynamic forces. A lot more light could be shed on monopolistic forces in marketing, but more imagination is needed than that used in following through a carton of celery to wholesaler X and retailer Y, and recording the time and price of each sale. If more were known on the influence of monopolies, there would be less dispute over anti-trust legislation. The important test is whether existing results are as satisfactory as any possible alternatives. The effective pursuit of marketing research into demand, into physical efficiency, and into more information on price-making forces would assist considerably in marketing efficiency, and might help to bridge the gap between self-interested commodity research and welfare goals of the whole economy.

DISCUSSION

CHARLES H. MERCHANT
University of Maine

Dr. Kimmel states that the broad objectives of any marketing research program must ultimately be established within the framework of the over-all social goals of the nation in our comparatively free society. Also, in general terms he states fruit and vegetable marketing research is "to provide information which will promote maximum consumer satisfaction through direction of resources to the production of the desired kinds and quantities of fruits and vegetables, and through facilitating most efficient transfer of these fruits and vegetables from farmer to consumer." I find it difficult to take issue with such statements, unless they are not specific enough for this occasion.

The major part of Dr. Kimmel's paper is devoted to a treatise of fruit and vegetable marketing research in three economic problem areas—demand, physical efficiency in marketing, and the operation of pricing mechanism. If I can contribute anything to this discussion, it is at this point. However, I am cognizant of the fact that the material may have been either briefly mentioned or implied in his paper.

I am fully convinced that fruit and vegetable marketing research should include, as one of the major problem areas for study, quality maintenance and the possibility of reduction in the deterioration of fruits and vegetables in the handling and distributing processes. Within this area I would include the subjects of better grade standards; improved inspection techniques; more practical containers for handling, shipping, and distributing the products; and more recognition of temperature, humidity, and other conditions in quality maintenance. This area of research is fundamentally basic to other research areas in the marketing of fruits and vegetables. Such losses and deterioration in fruits and vegetables before they reach consumers represent staggering losses of our productive output.

Attention needs to be directed towards another major problem area closely associated with quality maintenance, the maximum utilization of unmarketable and undesirable low grade fruits and vegetables and "surpluses." I agree with Dr. Kimmel that a real effort should be made to avoid so-called "surplus." However, this is not always possible, as weather and efforts of producers are partly uncontrollable and unpredictable. Information leading to programs for processing and other methods of utilization of such surpluses and off-grade products could have a twofold benefit. One would be to reduce losses and wastes now occurring in marketing of these commodities, and the other to help, in many cases, in stockpiling certain food commodities in our national emergency. It is obvious that many of the commodities in the fruit and vegetable field are not as well adapted to stockpiling as grains, cotton, and wool. However, there are many possibilities.

Under his section on "Physical Efficiency in Marketing," Dr. Kimmel discusses several approaches to the problem, such as a synthetic type of research and vertical and horizontal integration. I do not take any exceptions to these approaches to our research problems, but simply would like to emphasize the need for our research to be more forward looking and not merely to describe existing conditions and to study the possible efficiency of existing functions. The marketing research worker, if he is to be of maximum service, must lead rather

than follow in suggesting improvements and advancements in the industry based on sound research.

In my opinion, demand and price relationships are much more complex and involved than Dr. Kimmel's paper would seem to indicate. Here is an area of study which, due perhaps to its complexity, has received too little attention in the field of fruit and vegetable marketing. How important are psychological factors and how can they be best measured in consumers' purchases of fruits and vegetables in retail stores throughout the country? These factors are most difficult of measurement in any demand-price relationship. Until we have some reasonably accurate appraisal of these and other factors, we fall far short of understanding many demand and price relationships in the field of marketing fruits and vegetables.

MARKETING ROUNDTABLE—DAIRY PRODUCTS

Chairman: Donald E. Hirsch, Farm Credit Administration

INCREASING THE EFFECTIVENESS IN COORDINATION OF DAIRY MARKETING RESEARCH

Participants: S. M. Johnson, J. B. Roberts, R. J. Saville, R. G. Bressler, L. F. Herrmann, and Morris Rachlis

WE ARE entering a period in which the need for short-term research in the marketing of dairy products is becoming increasingly urgent. Meanwhile, the need for long-term research is undiminished. Despite this over-all increase in the demand for research, the supply of researchers is unlikely to expand during the next several years. This means that the productive efforts of available researchers must be utilized in the most efficient and effective manner possible.

One of the most promising possibilities for maximizing the productive efforts of dairy marketing researchers is to seek a greater degree of coordination of their activities. The National Marketing Workshops offer a medium for progress in terms of research methodology. They do not, at present, provide a basis for determining the direction which should be given to dairy marketing research, nor do they determine the degrees of emphasis which might result in a nationally balanced program of such research.

The marketing of milk and its products is becoming more and more national in character. Some regional groups of researchers have been organized to coordinate efforts to solve regional problems. Similar coordination may now be needed at the national level. Dairy marketing researchers need to develop a perspective that will keep pace with developments in their chosen commodity field.

It was in recognition of these circumstances that a program was developed to explore the topic of "Increasing the Effectiveness in Coordination of Dairy Marketing Research."

Procedure Followed At Roundtable

The objective of the roundtable was to promote more effective coordination of the dairy marketing research work conducted by the several state and federal agencies. This objective was attained in part by the simple arrangement of a meeting at which dairy marketing research specialists could become better acquainted in both a personal and professional way. Second, the group discussion of problems concerned in coordination of dairy marketing research stimulated thinking relative to the need for more effective coordination, and provided a basis for more formal and thorough investigations of that need.

Emphasis was placed on informality and group discussion. No formal papers were prepared for inclusion in the *Journal*. Instead, six brief opening statements were given by leaders in dairy marketing research. Representing federal agencies were Louis F. Herrmann, Production and Marketing Administration, United States Department of Agriculture, and Morris Rachlis, Canada Department of Agriculture.

The four regions established for purposes of coordination of research among agricultural colleges in this country were represented as follows:

East—S. M. Johnson, University of Connecticut
North Central—J. B. Roberts, University of Kentucky
South—R. J. Saville, Mississippi State College
West—R. G. Bressler, University of California

The opening statements were devoted principally to brief outlines of the kind and extent of coordination in the various geographic areas. The statements thus served to indicate the present magnitude of the opportunities and problems involved.

About 40 economists participated in the group discussion following presentation of the opening statements.

Postwar Development of Coordination

Coordination in dairy marketing research has existed for more than 15 years. In his opening statement, Dr. Johnson commented on the work of the New England Research Council during the decade of the thirties. However, in most regions there was no significant coordination of dairy marketing research until the Research and Marketing Act of 1946 became effective.

In commenting on the effect of the act, Dr. Herrmann stated as follows:

"The expansion of work under the Research and Marketing Act made the lack of coordination really serious. As each of the federal agencies expanded its own marketing research program, overlapping became conspicuous and dangerous. At the same time, the act facilitated an increased degree of coordination within the existing Departmental structure. Coordination of dairy marketing research in the federal agencies now is promoted in the following ways:

1. By the establishment of research advisory committees.
2. By the review and approval of projects by the Administrator of the Act.
3. By the establishment of Departmental working groups representing all agencies having an interest in dairy marketing.
4. By the establishment of the Central Project File.
5. By the broadened circulation of research reports for review within the Department before publication."

At the present time there are three federal agencies prominent in dairy marketing research. They are the Bureau of Agricultural Economics, the Farm Credit Administration, and the Production and Marketing Administration. There are also agencies in about 36 states that are concerned with such research.

Coordination among researchers employed by state agencies is effected, in part at least, through the regional technical committees. These committees assist researchers working on problems that cross state boundaries, and effectuate some pooling of manpower and ideas.

Benefits of Coordination

The principal benefits of effective coordination, as discussed at the roundtable, appear to be as follows:

1. There is a pooling of ideas and information with respect to problems, methodology, and the nature of the economic environment in which the studies are made. Such pooling of intellectual resources and research experience is of tremendous benefit as it tends to result in more effective research at less cost.
2. Competent research workers in dairy marketing constitute a limited resource that requires effective coordination as a tool to achieve maximum utilization. Marketing problems are increasing in number, size, and complexity, and effective utilization of research resources is of paramount importance.
3. The principal problems in dairy marketing can be investigated on a broad front and in a comprehensive manner.
4. Adoption of uniform research procedures can ensure comparability of results.
5. More effective research techniques can be developed and, as a consequence, results may be more valuable and more widely usable.
6. Unnecessary duplication of research work can be minimized.
7. There are benefits in planning as well as in execution of projects. Coordination can assist researchers to determine what they shall study as well as how they shall study.
8. Competition among research agencies and among individual researchers can be minimized or directed into effective channels.

The benefits of coordination in research can be achieved among projects at different marketing levels as well as among projects at a given level.

Problems In Coordination

The principal problems in coordination, as brought out by the opening statements and subsequent discussion, appear to concern the following subjects:

1. Allocation of funds: The distribution of the funds available is difficult to make on an equitable basis. Many factors must be taken into consideration. Although it is an administrative problem, unless handled carefully it may have adverse effects on the actual research work.

2. Diversity of interests: Frequently there is a tendency for the separate research agencies to be interested in diverse problems. Some "give and take" is necessary before projects involving coordination can be developed.
3. Selection of problems: Some problems in dairy marketing research may best be attacked at the local level. Others call for varying degrees of coordination. The identification of problems suitable for coordinated research at regional levels is still far from systematic.
4. Inflexibility of the program: It takes a long time to develop a project and obtain clearance and, when the project is once approved, major changes cannot be made readily.
5. Additional expense incurred: When appropriations for research are small, expense involved in attending coordinating meetings may be unduly large. Furthermore, time is lost in transit to and from the meetings.
6. Other demands on researchers' time: Many persons concerned with dairy marketing research also have teaching duties or research work in other fields. This places severe limitations on the kind and scope of the work they can perform in dairy marketing research.
7. Burden of paperwork: Considerable time is required to prepare the various written project outlines and reports that are necessary. Most of these reports are desirable from the standpoint of sound research methodology, but some are needed simply because the research workers cannot spare the time nor money to meet frequently.
8. Shortages of manpower: A coordinator may be needed to give direction to coordinated projects and to ensure comparability of research results. It is difficult to obtain personnel qualified to act in this capacity.
9. Personnel turnover: Changes in duties or positions frequently result in the assignment of new personnel to a project. Lack of continuity interferes with the rate and kind of progress made.
10. Diversion of attention from problems that are nonregional in character but important within smaller geographic areas: It is conceivable, though it may seldom occur, that researchers engaged in coordinated projects may neglect important local problems.
11. Duplication of local efforts: While one of the benefits that may be derived from coordination of research is the minimizing of unnecessary duplication, such duplication may actually be increased if regional or national projects are not selected carefully.
12. Exchange of information: There is at present no way in which a researcher can readily determine the nature and extent of all current research dealing with a particular subject. Adequate and accurate information about current research is needed by marketing researchers fully as much as information about current market conditions is needed by marketing agencies.
13. Censorship of research results: The more hands a manuscript must go through, the more it is apt to be changed. Conceivably, a report based on coordinated research may become so vague, as the result of such review, as to have its value impaired.
14. Relationships between research and regulatory agencies: The various state departments of agriculture are usually considered to be regulatory agencies, whereas the experiment stations and college departments are

thought to be concerned with economic research. However, approximately half of the local RMA dairy projects are conducted by state departments of agriculture. In general, there appears to be a need for greater coordination of the work of the state departments of agriculture with that of the colleges and federal agencies.

Opportunities For More Effective Coordination

The opportunities for more effective coordination, and the techniques by which the effectiveness of such coordination may be increased, can be summarized as follows:

1. A frequent criticism of marketing research in general is that too little time is spent on selection and planning of projects. This criticism applies to coordinated projects as well as to others. It would be desirable to establish criteria for the selection of problems suitable for coordinated research at the regional and national levels. Such criteria are an end in themselves in that they stimulate thinking about the problems requiring coordinated effort.
2. It would be desirable to list and to evaluate the principal problems in dairy marketing research and to classify them as to whether they may be handled best on a local, regional, or national basis.
3. It might be desirable to have a committee enumerate the major problems needing attention, give thought to those problems in terms of the need for increasing the effectiveness in coordination, develop an understanding of the common ground of dairy marketing research workers, and outline the ways in which the research activities of the various agencies may be coordinated.
4. Some method should be devised and adopted whereby research workers could be adequately informed as to the nature and progress of current research projects in the field.
5. It might be desirable to develop an organizational framework to foster coordination at the national level. This association might be similar to the National Conference of Research Workers in Citrus Marketing.
6. It might be desirable to have an annual directory of workers engaged in dairy marketing research.
7. Problems such as those engendered by a diversity of interests among the coordinating groups may be met by the development of separate subprojects under a given project title. However, this technique needs to be used very carefully, as its indiscriminate use can result in a collection of unrelated projects that entail little or no coordination.
8. There is need for greater uniformity in research methodology and in the improvement of the techniques of the science. Closer working relationships resulting from more effective coordination may contribute greatly to meeting this need.
9. The activities of existing mechanisms might be broadened to expedite coordination at the national level. Chairmen of regional committees, together with representatives of federal agencies, could meet to discuss common problems. The scope of the Central Project File might be widened to permit publication of brief progress reports on all dairy marketing projects conducted by all public agencies.
10. It would be desirable to provide for some relaxation of regional bound-

aries. It is not difficult for imaginary barriers to develop, as a result of custom, that can effectively limit recognition of and work on economic problems by agencies located in different regions. It should not be forgotten that the delineation of regions, while a useful procedure, is necessarily arbitrary.

11. When a problem that requires coordinated effort has been isolated, the researchers concerned have a real responsibility to work with each other and to use appropriate research techniques.

The dairy marketing roundtable provided an opportunity for researchers to give attention to both the limitations and opportunities that are inherent in coordinated effort. Perhaps the meeting will assist in the development of a more formalized approach to the related problems. In any event, there will be indirect benefits that should contribute toward more effective research in dairy marketing in the future.

MARKETING ROUNDTABLE—LIVESTOCK AND LIVESTOCK PRODUCTS

Chairman: Sam H. Thompson, Iowa State College

THE SAMPLE SURVEY AS A RESEARCH TECHNIQUE IN MARKETING LIVESTOCK AND LIVESTOCK PRODUCTS*

C. P. WILSON
Kansas State College

THE sample survey is a useful research technique in livestock marketing research as well as in many other fields. It is not a new technique. It has been used—and misused—for many years. Rapid progress has been made in recent years both with respect to the theory of sampling and the practical procedure of efficiently carrying out a sample survey. The research worker in livestock marketing needs to be familiar with the modern sample survey technique for two reasons. First, he may make use of published information which was obtained by the sample survey technique. In this case, he should be able to evaluate the information he is using. Second, the livestock marketing specialist often has occasion to obtain original data for specific studies or projects. In this case, he must know how to go about collecting the data in an efficient manner. The subject of sample surveys deserves re-emphasis because of problems involved in cooperative and coordinated regional research. If the results of two or more sample surveys are to be properly aggregrated, each sample survey must be sound in theory and properly executed.

Why take a sample survey in the first place? In seeking the solutions to specific problems, the research worker often is unable to find published information bearing directly on the problem at hand. Time and funds available for studying the problem are usually limited. It may be impossible or impractical to study an entire population, but it may be possible and practical to study a representative segment of the population. Sampling in this case is the problem of obtaining information from a representative segment of the population for the purpose of inferring something about the true state of affairs with respect to the entire population.

At this point it may be well to recall the difference between a probability sample and a judgment sample. The former is one for which the sampling errors can be calculated and for which the biases of selection, nonresponse, and estimation are virtually eliminated, or contained within known limits. Judgment samples are those for which biases and sampling

* Contribution No. 169, Department of Agricultural Economics, Kansas State Agricultural Experiment Station, Manhattan, Kansas.

errors cannot be calculated from the sample, but, instead, must be settled by judgment.[1] Judgment samples do not necessarily give unreliable results. The point is, there is no way of knowing whether the results of a judgment sample are reliable or not.

Ferber says, "There is no way of evaluating the reliability of estimates based on arbitrary selections."[2] Deming says, "The usefulness of data from judgment samples is judged by expert knowledge of the subject matter and comparisons with the results of previous surveys."[3] He also says, "Gone are the days when the intuition, guided by expert knowledge of subject matter, constituted sufficient qualifications for carrying out sample studies. Knowledge of subject matter of a survey is as essential as ever, but in modern practice, this knowledge must be combined with the theory of sampling."[4]

Modern sampling involves more than substituting partial coverage for full coverage. It is "the science and art of controlling and measuring the reliability of useful statistical information through the theory of probability."[5] "A sample can be more accurate than a census, under certain conditions," according to Houseman.[6] Yates says, "Indeed, a complete census can only be properly tested for accuracy by some form of sampling check."[7]

What, then, is an appropriate method of conducting a sample survey in the field of marketing livestock and livestock products? The characteristics of the population and the conditions surrounding the problem indicate the appropriate type of sample to use. The following is an example of a sample survey that was used by the Kansas Agricultural Experiment Station in studying the marketing of feeder livestock.

In 1947 the North Central Livestock Marketing Research Committee initiated a regional project on the marketing of feeder livestock. The Kansas Station was a cooperator in the project. Among the general objectives of the project were these:

a) To determine the sources of supply of feeder livestock and the areas of demand for them.
b) To study the methods and practices employed in marketing feeder live-

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[1] William Edwards Deming, *Some Theory of Sampling*. New York: John Wiley and Sons, 1950, p. 10.

[2] Robert Ferber, *Statistical Techniques in Market Research*. New York: McGraw-Hill Book Co., 1949, p. 69.

[3] Deming, op. cit., p. 11.

[4] Ibid., preface, page viii.

[5] Ibid., p. 2.

[6] Earl E. Houseman, "Sampling Methods in Marketing Research." *Agricultural Economics Research*, Vol. II, No. 3, July, 1950.

[7] F. Yates, *Sampling Methods for Censuses and Surveys*. New York: Hafner Publishing Co., 1949.

stock through various marketing channels and the means by which feeder livestock are transported.

c) To study costs of buying and selling through the different types of markets.

Each cooperating Experiment Station was to obtain for its state, by a sample survey, data pertaining to the numbers purchased and sold by farmers and ranchers, of feeder livestock of various classes, ages, and weights, the proportions purchased and sold through the various types of markets, the conditions of sale, means of transportation, etc. for the calendar year 1947. The question at this point was, "What would be an appropriate procedure to follow to obtain reliable data?" The regional group consulted with the Statistical Laboratory at Ames, Iowa. Since there were no known up-to-date lists of farmers and ranchers selling and buying feeder livestock, an area cluster sample was recommended. An area cluster sample seemed appropriate for Kansas. But funds available seemed inadequate for the job to be done. Fortunately, it was found that the Kansas Agricultural Statistician's office was desirous of obtaining by a sample survey certain data pertaining to farm storage stocks of wheat in Kansas, as well as certain check data for its estimates based on mail questionnaires. They were also considering an area sample survey, and they, too, had limited funds. By pooling resources the Kansas Agricultural Experiment Station was able to obtain its information on marketing feeder livestock, and the Agricultural Statistician's Office was able to obtain its data on farm storage of wheat and certain other check data. The procedure followed was similar to that of the master sample of agriculture for which there is ample reference in the literature.[8]

The Statistical Laboratory at Ames, Iowa, designed the sample and delineated the sample segments. Two hundred eighty sample segments were selected from 41,160 segments in the state. Enumerators were recruited and instructed jointly by the State Agricultural Statistician's Office and the Experiment Station. The survey was scheduled to require 20 enumerators 10 days for completion of field work. Eight hundred seventy-three farms were found in the 280 sample segments. Ninety-one percent completion was accomplished. Control of nonsampling errors of selecting farms was believed to be reasonably effective.

This is an example of a probability sample. Point estimates of population characteristics can be computed along with confidence intervals or confidence regions. Being able to calculate confidence regions is important. Point estimates based on samples are practically valueless unless confidence regions can be specified. The confidence region is the range of values within which the true population value is thought to lie. State-

[8] For example see "The Master Samples Project and Its Use in Agricultural Economics," by R. J. Jessen, *this Journal*, Vol. XXIX, No. 2, May, 1947.

ments can be made with respect to the probability that the confidence region, calculated from sample data, contains the true population value. As Ferber points out, "The ultimate objective of all sampling research is to develop techniques that will either yield the smallest confidence region at a given cost or a given confidence region at the most economical cost."[9]

As an example of the sampling error for the survey in Kansas, it can be pointed out that in estimating a variable, such as the total number of feeder cattle sold by Kansas farmers and ranchers, the coefficient of variation was 16 percent. The range in the number of head sold per farm was from five to 500.

For estimating a variable, such as the total number of farms in Kansas, the precision was much closer—the coefficient of variation was two percent. Comparing the point estimate of total number of farms from the survey in 1947 with the 1945 census indicates a slight bias in the direction of underestimating the number of farms from the survey. Further analysis indicates that the error was in missing some of the extremely small farms in the state. We feel that the bias was less than a direct comparison of the survey and census figures would indicate, because the average size of farm was increasing and the total number of farms decreasing from 1945 to 1947. Certainly this survey missed fewer small operators than would sampling from a list of known feeder buyers and sellers, or sampling only in areas on heavy concentration of feeder buyers and sellers.

I would like to point out a deficiency in the survey from the standpoint of this project and draw a generalization from it. As indicated above, the geographical dispersion of the segments sampled depended on the number and size of farms in a given area. In other words, no attempt was made to concentrate the sample in given areas. It was hoped that this would give us reliable estimates of both feeder cattle and feeder sheep and lamb data. This was not the case. The number of farmers selling and buying feeder lambs found in the survey was so small that reliable estimates could not be made. Our sheep and lamb data had to be discarded. If time and funds had been available, a more concentrated sample in the heavy producing and feeding areas would have given the results needed. The generalization drawn is that for purposes of studying a highly specialized group of producers, the master sample plan in itself is not an efficient method of obtaining data. But information from a master sample could be used to design a second sampling plan which would give the desired results.

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[9] Ferber, op. cit., p. 57.

By using an area sample as an example of a probability sample, it is not meant to imply that this is the only type of probability sample. Various other types can be used, depending on the conditions of the problem and the characteristics of the population. The area sample was used here principally because of the absence of a complete list of farmers and ranchers buying and selling feeder livestock. In another phase of this same project, a sample of the auctions in Kansas was desired to study the origin and destination of feeder livestock, type of seller and buyer, marketing charges, etc. In this case a complete list of auctions handling livestock in the state and their location were available. There was no information as to the number of head of feeder livestock handled, but the total number of head of each species of livestock sold was available. It was desirable to have geographical representativeness; and it was assumed that size of auction was associated with some of the variables to be studied. To improve representativeness and increase the precision of estimates, location and total number of head of cattle sold were used as bases for a stratified random sample.

A point to be emphasized is that livestock marketing specialists are not likely to get much help from our statistician friends in analyzing and interpreting the results of our surveys if we do not use sampling techniques that are sound in theory and properly executed. In particular, we cannot expect much assistance from statisticians if, after taking a sample survey, we run to them for help in analysis and interpretation, unless we can justify the method of taking that sample and executing the survey on theoretical grounds. As Deming says, "A skilled statistical theorist would be helpless in an analysis of a judgment sample if he were to depend on his knowledge of theory."[10]

Ideally, the research worker in marketing livestock and livestock products would also be a qualified statistician. If this were universally the case there would be little need for this discussion. Since this ideal situation is not always realized, the best alternative would seem to be for the livestock marketing specialist and the statistician to team up in carrying through specific research projects. This requires that the marketing specialist and the statistician be able to communicate with each other. Each must have an understanding of the other's problems in order to be able to work out practical procedures that will provide reliable information in an efficient manner.

It is just as inappropriate for a statistician to design a sample with inadequate knowledge of the condition of the problem as it is for a subject-matter specialist to design a sample with inadequate knowledge of sampling theory.

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[10] Deming, op. cit., p. 11.

There is need for a close working relationship between subject matter research personnel and statisticians. If subject matter research personnel are also qualified statisticians, the ideal situation is approached. If a livestock marketing specialist is not also a sampling specialist, technical assistance from a qualified statistician can usually improve the efficiency of any sample survey he may be contemplating. This presupposes, of course, that each is sufficiently well versed in the other field so that they can understand each other.

THE IMPORTANCE OF GRADING IN RELATION TO LIVESTOCK MARKETING

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IN CONSIDERING the matter of grading in relation to livestock marketing, it is desirable, at the outset, to define what is meant by "grading." There are two types. We might refer to one as commercial grading and to the other as official grading.

For as long as there has been commercial trading in agricultural products, there probably has been commercial grading in some form. It is the sorting of products of the same class into groups according to degree of desirability and the use of those as a basis of trading. Buyers of cattle in stockyards will, on any given market, vary the price they pay according to weight, finish, and their estimate of dressing percentage on any given animal or lot. That is commercial grading. Most meat packers put up two or three brands of bacon, selecting the choicer sides for the top brands. While it is not referred to as such, that also is commercial grading. Such grading obviously is important in livestock marketing. It is, in fact, an integral part of the marketing of all agricultural products. That is so because the establishment of values is a part of marketing and values cannot be established without reference to quality or age or size or some such factors.

Official grading is the establishment of grades by government authority, with the grading done or supervised by some governmental agency. The scope and purpose of that grading go much beyond the mere establishment of categories to serve as a basis of trading. It has as its objective the improvement of marketing conditions for the products to which it is applied.

In livestock, as in many other agricultural products, commercial and official grading are both utilized. Thus, in the case of cattle, and I think in the United States as well as in Canada, a commercial grading system is used very largely in the purchases of live cattle. In the sale of beef, on the other hand, official grades largely are utilized.

As the place of commercial grading in the marketing process is pretty well self-obvious, the time of this paper might best be spent in reviewing the purpose and importance of official grading programs in relation to livestock marketing. To do that, a brief review of its development is desirable.

As stated earlier, grading in some form or other has long been applied in the purchase and sale of farm products. Sometime around the turn of the present century, a new concept of grading started to develop in both

the United States and Canada, and, in fact, in other countries. Grading established categories which were a basis of trading. To avoid dispute between buyer and seller, there seemed to be some merit in having the grades established and interpreted by an independent, disinterested party. The task seemed to fall logically on some department of government. There followed gradually the development of official grades by some government body, with the grading done or supervised by some federal agency.

As government departments entered the field, the idea developed that grading could be made to serve a much more fundamental purpose than simply to establish a basis of trading between buyer and seller. The interests of agriculture require that it produce the type of product that its domestic and foreign customers want. They require, also, that those categories should be identified so that the demand from the ultimate buyer would be expanded as he bought with increasing confidence. Grading, it was realized, could be made to serve those purposes and thus become a vital force for the good of agriculture.

Grading, in that sense, is designed to serve one major function—to improve the market position of any commodity to which it is applied. It performs that function in one or both of two methods. The first is to encourage the production and marketing of better quality products. To do that it obviously is necessary that the producer's product be graded as it is marketed by him and that he be paid on a basis of grade. The second is to create confidence on the part of the buyer so as to expand demand and improve the relative price position. To do that, in turn, it is necessary to identify the product by grade to the buyer, whether he be a trader or an ultimate consumer.

To some extent these ends are achieved by promotion on a voluntary basis. To some extent they are achieved by legal means; by making grading compulsory for one or both purposes. But whatever the means by which the end is reached, it is probably the hope of the proponents of every grading program that eventually, in the interest of the producers of that product, it will be widely applicable to all classes of trading.

Passing from the general to the particular, we shall review some instances to illustrate the importance of official grading, in the sense that we have now defined it, in relation to livestock marketing. It will, I am sure, be understood that a Canadian must speak from a background of Canadian experience.

I mentioned a moment ago that one function of official grading was to encourage the production of the class or grade of product in greatest market demand. The effectiveness of such a program can be illustrated by Canadian experience in hog grading. Over a long period of time Canadian hog producers have had two major outlets for their pork

products. One was to Canadian consumers, the other to Great Britain in the form of Wiltshire sides. In the British market, Canadian pork had to compete with products from several countries, including Denmark, which had high reputations for bacon. The British demanded a lean bacon; hence, if Canada were to make any inroads in the British market, it had to supply that type of product. Canadian consumers also have a distinct preference for lean pork. It is true that to a considerable extent pork which is originally fat can be made lean for the consumer trade by careful trimming, but this is a wasteful and costly process. Many years ago, therefore, the leaders of the Canadian hog industry became convinced that the best interests of that industry would be served by encouraging the widest possible production of what is known as a bacon type hog.

The move in this direction started about 1920. Several policies were introduced to encourage greater emphasis in the production of bacon type hogs, but the most important of these, started in 1923, was the introduction of a system of hog grading. At that time the grading was done on the live hog. In the late 1930's there was a transition to carcass grading. In each, however, the emphasis was on bacon type of desirable weights, with the fatter, lard type hogs going into the lower grades. The grading was gradually made compulsory, with hog buyers being required to pay producers on a basis of grade. The pull of price, through the premium for the top grades, soon started to have the desired effect, and the results over the 30-year period speak for themselves.

When grading was started, as low as two percent of the hogs in western Canada went into the top grade. Today, 80 percent are in the two top grades. In 1920, Yorkshire hogs, the most common bacon type breed, comprised only 37 percent of registrations in the Canadian National Live Stock Records Association. In 1949 they were 90 percent, and the Canadian swine industry had swung over very largely to a bacon type hog. Publicity and sound production policies, of course, played a part in this transition, but grading and the payment of a premium for the type of hogs the market wanted was the dominant influence. While the field was one, obviously, in which large opportunity existed for improvement, the accomplishments illustrate the importance of grading to livestock marketing in that phase associated with graded purchase from producers.

In Canada, in addition to hog grading, we have had one other major official grading program in the livestock field. That is for beef. It has differed from hog grading in two important respects. Whereas hog grading has been compulsory, beef grading, with one minor exception, has been entirely a voluntary policy. And whereas hog grading was designed to assist marketing by encouraging the production of a desirable

type of hog, beef grading had as its primary purpose the identification of quality to the consumer as a means of broadening the demand.

In beef, of course, the carcasses are graded and a ribbon grade brand is placed on the carcass so that it shows on all major cuts and can be identified by consumers in retail stores. The grading has been confined largely to the two top grades—A, or Choice, identified by a red brand; and B, or Good, identified by a blue brand. The one exception is in the city of Vancouver, where all beef must, by law, be graded for sale to consumers.

The success or importance of a program of this kind can best be measured by the extent to which it is utilized, since its utilization comes as a result of public demand. In 1931, when beef grading was started, sales of graded, branded beef totalled 17 million pounds. By 1950 this figure had increased to 116 million pounds. Today, all beef of choice and good quality killed in inspected establishments is being graded. There is a growing requirement on the part of purchasers that C, or Commercial, grade be identified as well. Consumers have a reliable means of identifying the top qualities in beef; and the widespread demand for grading indicates that it is serving an important place in beef marketing. The beef grading program furnishes one excellent illustration of the manner in which consumers, given the chance to do so, will express their preference for the kind or grade of product they want.

The sale of all beef to consumers by grade became compulsory in the greater Vancouver area in 1939. Not only the top grades, but the lower grades as well, were identified and sold by grade. In 1939, 36 percent of the beef sold in Vancouver was of the two top grades. The public demand for the higher grades was so persistent that by 1942 this figure had increased to 60 percent. To satisfy their trade, Vancouver packers became notoriously active buyers of top quality cattle from the neighboring provinces. In June of this year, to quote the most recently available figure, 55 percent of the cattle slaughtered in British Columbia, of which Vancouver is the chief consuming area, were grades A and B. For the whole of Canada those grades comprised only 35 percent of June slaughterings.

The experience with hog and beef grading in Canada illustrates the important part which grading can play in relation to livestock marketing. The question which might next logically be asked is this: If grading can do what it did for hogs in improving quality and type, and if it can do what it is doing for beef in building greater consumer confidence, why should it not be extended to cover the whole field of the purchase and sale of all livestock and livestock products?

The answer is that to some extent that is happening. In Canada there are official national grades for lamb, mutton, and veal, operating on a

voluntary basis; and for wool, on which purchase on grade from producers is largely required by law. In not all products, however, does quite the same opportunity exist to make use of grades as a means of improving the general market position. Pork, for instance, is sold very largely in the form of processed meats, with the acceptability to the ultimate consumer depending at least as much on the method of process and degree of trim as on the quality of the original carcass. The purchase from producers on official grades could hardly do the same for the beef industry as it did for hogs, as an appreciable percentage of the total beef supply is a by-product of the dairy industry.

In spite of those limitations, there is in Canada from at least some sections of both producer and consumer groups, an insistent demand for a wider extension of grading. Directly or indirectly, for instance, there is an increasing tendency to purchase cattle in relation to the official grade of the carcass. This demand for a wider application of grading is, in itself, an indication of its importance in livestock marketing.

DISCUSSION

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The Agriculture Division of the Dominion Bureau of Statistics conducts sample surveys for the purpose of making semiannual estimates of livestock numbers. These samples are of the voluntary mail questionnaire type, and under Mr. Wilson's classification, are "judgment" samples. A paper by Mr. Holmes to be presented later this week will discuss this procedure in detail; therefore, no attempt will be made at this time to analyze the points in its favour or the weaknesses inherent in the method. The use of this type of sampling is due primarily to cost and time considerations. The Agriculture Division has not been allotted the facilities in staff and funds to conduct research projects involving direct enumeration. Continuous efforts are directed to "managing" the sample so as to eliminate the effects of biases due to lack of representativeness and the changing of reporting patterns. Estimates of livestock marketed are also made from the samples and tested by available check data. These estimates are made for the most part on the "balance-sheet" principle after population estimates have been derived from the sample; i.e., sample indications on purchases, live sales, number killed for home consumption, sale as meat, and death loss are related to inventory at the beginning and end of each estimating period.

Area probability sample surveys for other classes of livestock, similar to a current research project in New Brunswick on poultry undertaken by the Economics Division, Department of Agriculture, might be expected to provide excellent check data, or even to set "bench-marks" for producer marketing, where it is practicable to include this in the objectives of projects and to adapt the

statistical design for the data. Useful check information on local butcher kill and farm slaughter, both as to number of animals and carcass weight, has recently been obtained from surveys in Saskatchewan and British Columbia, where district agriculturists conducted the enumerations in cooperation with the Bureau. The data would be much more useful had probability sampling been practicable.

Mr. Wilson in his presentation has outlined for us a set of precepts and goals relating to sample surveys. The gist of his argument points out the necessity of using a well-stocked chest of theoretical tools for any sampling project; and such emphasis, needless to say, is always appropriate. Coupled with this is the emphasis upon a thorough examination of the objectives for each survey project and the adoption of the most suitable statistical design. The standards of performance outlined would be those practiced by institutions individually or collectively in a country comparatively mature in its development of agricultural economic research, having a sufficient supply of well-trained, experienced statisticians, and sufficient public support to provide the necessary funds.

While the development of agricultural economic research in Canada has to some extent paralleled that of the United States, we are relatively only on the fringe as far as launching into probability sampling is concerned. For wide application of probability sampling to marketing research at the producer level, we still lack sufficient description of the universe on an area basis to be able to design the sample and preliminary surveys; pre-sampling with universe description objectives will still be necessary. We do not have a master sample of agriculture, we have limited funds, and we have been able to retain comparatively few competent statisticians who also have agricultural training. Many of these have found that material rewards are greater in the United States.

Findings from what Mr. Wilson has called "judgment sampling" cannot be ascribed known confidence intervals. This in itself would not be too serious, if the limitations of the findings were generally recognized by users of statistics. It is too frequently found that findings are reported without reference to their limitations, and this leads to generalizing and using conclusions far beyond those the investigator originally intended.

Mr. Wilson stresses the planning of a research project. Emphasis on more complete planning is important. In fact, some authorities suggest that approximately one third of the time and cost going into the average project could be devoted to planning, designing, pre-testing of schedules, and setting out tabulation plans. Most of us are guilty of proceeding with studies and with detailed questionnaires without first having made adequate plans, sacrificing quality for quantity of data, and then trying to make the best use of what is obtained.

The determination of probability limits or confidence intervals in a probability survey is applicable to a schedule with relatively few questions, all of which should be pertinent to the stated objectives. As Mr. Wilson points out, one of the practical considerations is that with proper planning one can obtain maximum precision for a given cost or minimize cost for a given precision. Despite what has been said in favour of keeping the schedule brief, joint consultation between two or more agencies will frequently result in one or two additional questions yielding a high marginal return; e.g., a livestock marketing survey at producer level might yield as a by-product estimates of livestock numbers.

DISCUSSION

GERALD ENGELMAN
Bureau of Agricultural Economics

Mr. Barry lists two basic functions of grading, (1) to encourage production of a better quality product and (2) to expand consumer demand. However, he ties it all up to "improving the market position of the commodity," which in this instance, I presume, refers to the interests of the producers and processors of livestock and meats.

Last week I attended a marketing workshop at East Lansing, Michigan, where I heard one of the ranking agricultural marketing economists in the United States declare the primacy of producer interest much more bravely and unreservedly. It was said that the important use of a grading system was to segment the supply to enable the monopolistic exploitation of differential consumer want patterns. This is to be accomplished by discriminatory marketing and pricing policies, assuming that leakage between the consumer want groups (which differ geographically, temporally, or culturally) can be prevented. This speaker further asserted that, while it was easy to demonstrate monopoly gains to producers, he had never seen a clear-cut analysis of how grading benefits the public in general.

Let me say at the outset that I do not vigorously disagree with Mr. Barry's point of view. I would perhaps change the emphasis. But as a public servant who has done some work in developing grade standards, may I say that I find rather repugnant the notion that this work is all directed toward enhancing monopoly gains.

It strikes me that the general objective of any grading system is to make the pricing mechanism a more effective means of communication through which consumers can indicate their preferences to producers in order to bring about the appropriate production responses. The public welfare goals of economic activity include the maximizing of consumer wants or satisfactions with the minimum use of resources. A properly functioning grade standard facilitates the effectiveness with which the pricing system can accomplish these maximizing wants–minimizing resource use goals.

A listing of the functions of a grading system could be quite numerous. Broadly speaking, however, I believe they can be classified under two headings: (1) those functions that contribute to greater efficiency in marketing and distribution, and (2) those functions which enable resources to be allocated more effectively to satisfy consumers' wants, thereby contributing to greater efficiency in the production sector of the economy. The emphasis is on efficiency in both of these headings. Greater efficiency means greater productivity, a larger aggregate national product, the *public* benefit which results from grading.

Functions that contribute to greater efficiency in marketing and distribution include such categories referred to in marketing literature as "facilitating trade" and "enabling sale by description." Accomplishments during 25 years of beef carcass grading in the United States may serve as an example of some of these gains. Prior to the introduction of beef grading, about two thirds of the meat was wholesaled through branch houses or independent wholesale houses where each carcass was sold to the retailer on the basis of personal inspection, a relatively costly system of distribution. Currently, less than one third of the meat produced in the United States is wholesaled in this manner, the remainder

being distributed through more direct, and presumably less costly, methods. The more direct channels, whether car or truck route, or sales to chain stores, are made possible by sale by description. Grade standards have particularly facilitated the development of mass merchandising methods by chain stores. From his office in Denver, a chain store buyer can buy carcasses in Chicago for retail stores in Washington. Ten minutes later he may negotiate in San Francisco for deliveries on the West Coast. Without grade standards this type of mass procurement and its associated economies obviously would not be possible. The use of federal grades also has opened new and far distant outlets for small packers, a sector of distribution formerly preëmpted by the large packers with their extensive branch house systems and privately advertised brands. Rather than enhancing the monopolistic gains of large processors, in this instance at least, the federal grading system has tended to raise the level of competition in meat distribution.

An example of what might be accomplished by more effective allocation of resources can be drawn from the instance of hogs, which today are commonly sold in the United States for a flat price within weight groups with little attention paid to quality. In oversimplified terms hogs yield a joint product, low valued lard and high valued meat cuts. But the quantitative ratios of these two products can be varied with respect to each other. Without appropriate grade-price differentials, farmers in the United States continue producing hogs which yield excessive amounts of lard. This results in a substantial waste of corn and other feed resources, resources which could be allocated to the production of a larger output of the more highly desired meat cuts. Canada has largely solved this problem with the adoption of the rail grade and weight system of selling hogs. The results in terms of altered producer responses to changed economic incentives, as pointed out in Mr. Barry's paper, are of great significance. In the view of many students of marketing, the United States could do well to emulate Canada in this regard.

Research is needed to demonstrate the extent to which savings could be effected in more efficient resource use with the adoption of a carcass weight and grade system of marketing hogs in the United States. The theoretical tools are available. I have in mind the indifference curve and iso-cost curve analyses which have contributed substantially to recent developments in farm management research. In this instance, these tools would apply equally well to marketing problems. Indifference curves can measure the substitution ratios between fat and meat cuts in the aggregate consumer want pattern. The iso-cost curves will measure the varying yields of fat and meat cuts which can be produced from a given quantity of corn and other feed resources when fed to hogs.

Until the postwar period, research in the development and improvement of grade standards was almost entirely the prerogative of the animal husbandry meat specialist. In my judgment, this area is a fertile one for interdisciplinary cooperation between the meats specialist and the agricultural economist. The meat specialist brings his skills in technology to the analysis. It is up to the economist to indicate the aggregate consumer preference with reference to varying qualities of meat. For in order to have any usefulness or acceptance in the retail trade, market grades must be consumer-oriented.

Since objective methods for specifying the degree of finish of hog carcasses have been devised, one of the important remaining areas of research is the development of consumer grade standards for pork cuts. These are needed not only to enable the consumer to express his preferences in the market-place more

effectively, but also to add more precision to existing objective hog carcass grade standards. The optimum grade of carcass should be as lean as possible up to the point where substantial numbers of cuts are discounted for lacking quality. We don't know, however, just where that point is located.

In research on consumer grades of pork cuts the meat specialist is properly concerned with organaleptic studies, generally using taste panels to determine how palatability is associated with tenderness, juiciness, and marbling. These latter attributes are usually functions of the finish or fatness of the animal. A large majority of the hogs in the United States, however, are marketed at a degree of finish far in excess of the minimum requirements for acceptable palatability. Just watch the consumer as she selects her pork chops, center slices of ham, bacon, and picnics at a self-service prepackaged fresh meat counter in the United States. In almost any geographical area I venture to say that you will generally find her trying to select those cuts with the most lean and the least fat. Very seldom is she concerned about inadequate finish.

I do not believe the American consumer differs greatly from the Canadian consumer in her preference for lean pork. The difference is that the Canadian consumer is getting the lean pork she wants.

Since the economist is oriented to aggregate consumer demands, he might approach this problem by getting up a controlled consumer behavior study, measuring the rate of movement of comparable retail cuts differing only in degree of finish.

Probably both the taste panel of the meat specialist and the consumer behavior study of the economist are necessary techniques of analysis. The consumer behavior study can be used for setting up standards in that large sector of the degree of finish scale where lean-fat ratio is of utmost importance in consumer minds. The taste panel would be valuable in that critical sector where the meat begins to suffer in palatability because of inadequate finish. The problem is important. Much research is needed. And in this area the two disciplines can accomplish much more working together rather than working separately.

MARKETING ROUNDTABLE—POULTRY AND POULTRY PRODUCTS

Chairman: Henry E. Larzelere, Michigan State College
Secretary: Ralph L. Baker, Pennsylvania State College

TOPIC I: HOW CAN ECONOMIC RESEARCH DEVELOP MORE EFFECTIVE INCENTIVES FOR MAINTAINING QUALITY OF POULTRY PRODUCTS DURING MARKETING?

I. Opening Statement, G. M. Beal
University of Maryland

SINCE quality maintenance is more complex through the marketing channels for fresh killed than for frozen poultry, this short paper will be limited to the former, and will deal rather exclusively with broilers.

In recent years, an increasing number of poultry processing plants have added facilities for the preparation of eviscerated and cut-up chicken. Furthermore, there is a definite movement toward the prepackaging of chicken parts in retail stores. These developments have increased the difficulty of quality maintenance by adding to the number of individuals engaged in partial processing at various stages in the movement of fresh-killed birds from the producer to the consumer. Thus, quality maintenance during marketing involves sanitary precautions, display arrangement, and price policy as well as temperature control, and effective incentives must be applicable wherever changes in form utility occur.

Incentives for quality maintenance appear to be of three general types: First, there are financial inducements. These include premiums for superior quality, or penalties in the form of markdowns, spoilage, or competitive loss of volume due to dissatisfied customers taking their business to more careful competitors. The second type of inducement is improved know-how and the use of technological aids. It is quite likely that many poultry handlers fail to maintain quality simply because they are not familiar with the best techniques and procedures for doing so. Legal incentives are the third type. Legally enforcible standards backed by adequate penalties can contribute to food quality maintenance. This type of inducement has been singularly lacking in the poultry industry.

Economic research can make a significant contribution in all three of the foregoing phases, but it is doubtful that economic research alone can actually develop more effective incentives. Individuals in the trade, consumers, legislative bodies, or administrative agencies must take courses of action based upon economic studies if this type of research is to influence the development of more effective incentives for quality maintenance.

Premium prices depend primarily upon consumer recognition of superior quality and a willingness to pay the necessary differential. Economic research can contribute to the development of more effective incentives of this type in three ways: (1) By consumer surveys, (2) by controlled experiments designed to determine the amount of premium that consumers are willing to pay when the opportunity of selection is available; and (3) by means of time and cost studies for the determination of the additional premium necessary to supply the market with superior quality birds. Consumer surveys provide a method of determining consumer preference by random sampling in residential areas. Controlled experiments may be set up to simulate as nearly as possible the alternatives open to consumers at the retail store meat counter. Controlled experiments may be used to determine the extent of quality maintenance in relation to costs by varying practices and the adoption of new technological aids. The influence of display methods on rate of turnover and the role of price policy on quality maintenance are also important factors for investigation by this method.

Time and cost studies involving intensive investigations under controlled conditions may be employed to provide information for comparing methods of handling New York dressed, eviscerated or cut-up chicken in order to determine the relationships between quality maintenance, marketing costs, and consumer preference. Controlled experiments are not always mandatory in time and cost analysis. Under some circumstances, a sample of existing methods of quality maintenance may be analyzed in order to determine the amount of premium required by marketing agencies to provide superior quality broilers.

Economic research can also contribute to quality maintenance by pointing up the extent of monetary loss experienced by poultry handlers through spoilage and markdowns incident to quality deterioration, together with recommended methods and probable costs of avoiding these losses. A study of this type in retail stores was initiated by the Maryland Experiment Station on July 1, 1951.

In the course of studying economic losses due to spoilage and markdowns at various stages of distribution, comparative analyses can also be made of alternative methods employed in maintaining quality of fresh poultry. On the basis of these comparisons, handlers can be informed on the nature of available methods, their relative costs, and the degree of effectiveness which might be expected.

Economic research may provide guiding principles for legislative action and subsequent development of grading and inspection service programs for fresh poultry. Federal poultry grading and inspection services have been carried on for more than 20 years. Authority for these services was first provided in the so-called Farm Products Inspection Act passed in

1917. Since then, the authority for continuing these programs has been contained in the annual Department of Agriculture Appropriation Acts. Regulations governing the conduct of these services have been revised and modified many times during their existence. The latest revision became effective July 1, 1951. In developing the existing regulations, according to P.M.A. officials, no useful economic studies were available on poultry. This appears to be a new and potentially important field for economic investigation. A program which involves voluntary acceptance of regulations for maintaining quality during marketing cannot possibly be successful unless the costs of cooperation are reasonably commensurate with anticipated benefits. Apparently no such investigations were made prior to the initiation of the present program, and both the industry and the regulatory agency will be in need of guidance concerning the economic feasibility of compliance.

II. EDWIN H. MATZEN
Production and Marketing Administration

THE Chairman is to be commended on the excellent choice of topics for this session. They have wide interest and are of concern to the poultry industry and those doing research and educational work in this field.

What commodity has greater possibilities of and need for incentives to maintain quality than eggs? We have many indications that consumers are interested in obtaining good eggs. We have price differences among grades,[1] sizes, shell colors, eggs of different trade marks, etc. There is also plentiful evidence that many consumers are not satisfied with the quality of eggs they have found in the retail stores. Many go out of their way to obtain eggs from special sources—even though doing so is frequently less convenient and more costly.

A. *Some of the Barriers to Increasing Incentives for Maintaining Egg Quality Are:*

1. Nature of the Egg Industry—since it is a small and a minor enterprise for many producers, handlers, and retailers, a lack of interest and concern on the part of many prevails. Also, the seasonal nature of quality change and economic incentives complicates the problem.
2. Lack of reliability of grades due to:
   (a) Quality changes after grading.
   (b) Many using like or similar grade terminology but different and changing standards.

[1] "Grade," unless otherwise indicated, refers to trade grades as well as those based on federal or state standards.

(c) Subjective limitations of grading uniformly.

3. Imperfections in standards in reflecting

(a) Consumers' likes and dislikes.

(b) Consumers' ability to differentiate between grades.

4. Expense and difficulties of measuring the level of quality and changes in quality at various points in the marketing channel.

5. Lack of facts regarding the economic significance of quality losses and costs of reducing losses.

B. *Nature of Research*—Brief mention of the nature of some research results should stimulate discussion.

In the Northeast and North Central States extensive studies have been completed to measure egg quality levels, quality changes, and associated factors in the early stages of marketing. In the Midwest one third of the eggs were below A quality when received at country receiving points. Eggs purchased on a graded basis were higher in quality and contained fewer stains and dirties than eggs purchased on an ungraded basis. Nearly 60 percent were purchased ungraded—the proportion varying from one fourth in Minnesota to three fourths in Missouri. The decline in quality between gradings at country receiving points and central plants was equal to one egg out of eight declining one grade. The time between gradings and the temperature of eggs was directly related to quality change. In the Northeast, egg quality level was appreciably higher, the greatest change occurred between the first and second receiver; and certain flock management and holding conditions were found associated with quality levels.

A regional study of retail stores in the Northeast gives some indication of the frequency and extent that eggs failed to conform to grades under which they were sold.

Eggs purchased in retail stores in Minneapolis in August, 1947, graded 23 percent A's and in April 1948, graded 50 percent A's. This illustrates the seasonal nature of quality change.

A study in the State of Washington indicated that one third of the eggs remained in stores more than five days and one tenth stayed in stores 10 days or longer.

A report of work in Texas indicated that in an experiment, "Grade A" eggs were displayed alongside "Infertile Fresh" eggs. The latter outsold the Grade A two to one even though of less desirable quality. This not only indicates that we need to know how consumers differentiate between qualities, but also that terminology may be important.

Considerable work of interest has been reported by technologists. They have much to contribute that will be important in the research suggestions which follow.

C. *Research Needed*–The following types of research will aid in increasing the incentives to maintain egg quality:

1. Investigating consumer preferences to determine likes and dislikes, providing factual basis for improving quality standards.
2. Ascertaining where consumers buy eggs, why, what price they pay and what quality eggs they obtain.
3. Evaluating the efficiency and effectiveness of grading eggs, to determine the attributes required in graders, and the conditions and methods effective for better and cheaper grading.
4. Evaluating quality losses in the marketing channel under varying conditions to appraise the economic feasibility of making adjustments in methods or equipment.
5. Determining the influence of egg quality level or degree of uniformity in quality level on consumer purchases.
6. Studying plant layouts and product flow in order to devise more convenient or less costly operations affecting product quality.
7. Evaluating incentive payments to haulers, candlers, and other workers, which may offer possibilities of increasing quality from producers, decreasing quality declines, or improving grade reliability.
8. Evaluating various sampling techniques useful for an egg quality control program.
9. Evaluating the influence of educational and promotional programs.

In closing, I wish to express my belief that in the last decade great progress has been made in improving the quality of eggs available to consumers, in improving the reliability of grades and trade marks as an indication of egg quality to consumers, and in more equitably reflecting quality differences back through the marketing channel to producers. However, there remains a fertile field for research toward increasing incentives to maintain egg quality.

SUMMARY OF DISCUSSION

The discussion period was devoted almost entirely to questions concerning egg grading. It was suggested that there is a basic need for better communication between the homemaker and the producer. Is the homemaker interested in the level of quality or the uniformity of quality? It was generally agreed that both are important, but there was some disagreement as to the relative weights which should be accorded each.

A majority of the group seemed to believe that the homemaker is indifferent to quality determination. The question arose, "If this is true, then why grade eggs?" The group felt that a homemaker pays more for some eggs than others because she uses price as the criterion of quality; that is, she thinks that a higher price means a better egg. Limited research indicates that such an idea concerning the homemaker may be only partially true. Representatives of retail organizations indicated that homemakers know something of the qualities

of the freshly laid egg but that most do not make extremely fine distinctions in quality. The trade representative indicated that the use of the Grade B term does not cause an unfavorable reaction on the part of the homemaker, although price differentials between A and B eggs are important to many homemakers. The major existing incentive for maintaining product quality is interest in repeat sales.

It was suggested that the greatest impediment to adoption of federal standards has been the tolerance permitted for lower qualities of eggs in higher grade packs. Egg handlers using the federal grading service pack the "tolerance" eggs rather than assume the tolerance is included in the standards to permit some judgment differences among graders or small decreases in quality level during the market journey.

The need to consider both supply of and demand for the various qualities of eggs was stressed.

MARKETING ROUNDTABLE—POULTRY AND POULTRY PRODUCTS

TOPIC II: AN EVALUATION OF INTEGRATION IN THE POULTRY MEAT INDUSTRY*

I. Opening Statement, E. L. Baum
The State College of Washington

Introduction

THE market for poultry meat in the United States has expanded rapidly during the last five years. This expansion has been made possible by technical innovations of biological and mechanical natures in production, processing and marketing, favorable cost-price relationships to poultrymen, and favorable price relationships with competing meats.

The rapid expansion of this industry has created many economic problems, especially for poultrymen, cooperatives, and proprietary poultry meat handlers. The important problems considered in this paper are: (1) creating and maintaining resource use efficiency in primary meat production and processing, and its movement through distribution channels; (2) developing and maintaining a standardized product of high quality. If these problems are adequately handled, then this dynamic industry should exhibit orderly marketing in the sense that (a) poultry meat growers will receive satisfactory returns for their products; (b) processors will receive returns on their investment that will maintain adequate capital in this industry segment; (c) marketers will develop their merchandising program to maintain or encourage a high level of daily sales; and (d) consumers will be able to secure a product that is of a high and invariable quality.

Need for Vertical Integration

At present, this particular industry is not in a position to achieve the defined condition of orderly marketing in many areas because it is relatively unorganized, i.e., there exists a lack of coordinated effort among the segments necessary to insure a proper allocation of productive resources in meat production, processing, and distribution.

This researcher presents the thesis that a high degree of vertical integration in the commercial poultry meat industry is necessary if it is to achieve orderly marketing as defined, expand, and remain profitable. The achievement of stability in the system would result in the elimination of market gluts and the "in-and-out" nature of the poultry meat industry.

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* Scientific Paper No. 1050, Washington Agricultural Experiment Stations, Institute of Agricultural Sciences, The State College of Washington, Pullman.

Both the hatcheryman and the poultry meat grower should be integrated into a well coordinated production and marketing system. Success will depend largely upon the sound foresight and prudent management exhibited by the processor-wholesaler in his influence on entrepreneurial decisions in other segments of the industry. The processor-wholesaler is in the best position to determine the supply-demand conditions for this food item. It is the responsibility of the poultry meat handler to reflect this knowledge back to the hatcheryman and the producer. Also the handler should aid the producer by intelligent direction in (a) securing the proper growing conditions and (b) determining the most profitable time to market his birds. The first point is important because certain quality attributes of the finished product can be developed only at the producer level. The latter point is relevant because there exists a short-time interval between the time meat birds are ready to be marketed (point of maximum profit in production) and the time they are in the area of rapidly decreasing net returns.

The poultry meat grower usually formulates his production plans in the light of his own imperfectly determined estimate of the over-all future supply-demand situation with respect to present and future price-cost relationships. The poultryman who is faced with narrow profit margins needs expert economic and technical aid, so that he may allocate his resources to meat production in such a manner that maximum returns for the enterprise are realized. This may best be achieved through the proper functioning of a highly integrated production and distribution system.

The hatcheryman who is left out of an integrated system is in an excellent position to aggravate possible market gluts and foster the continuance of a disorderly "in-and-out" condition. A desirable system would be one in which the processor-wholesaler (handler) would control the hatchery supplying his producers so that the future numbers of chicks hatched would adequately take care of his market needs.

The high degree of vertical integration may take the form of strong cooperative action among producers, or it may be achieved through the effort of a proprietary handler.

Evaluation of Integration

In a desirable integrated cooperative organization, management would have jurisdiction over the grower's marketing decisions. The association would remove the major element of capital rationing faced by the producer by extending adequate credit on feed and chicks. Also, the cooperative would remove much of the risk and uncertainty of short-run price fluctuations confronting the producer by pooling all returns over a three- or four-month period. The producer would receive a provisional payment at the time the birds are marketed, with the remainder (less credit) ex-

tended at the end of the pool period. A pooling arrangement that features a monthly moving average price may be considered. If the cooperative is able to arrange satisfactory future contractual arrangements with large chains or other retailers, it may be wise to omit this function from the integrated system. However, if such contractual arrangements cannot be secured, it may be necessary to include the retailing function (specialized poultry stores) in the integrated system.

The ideal vertically integrated proprietary firm, like that of the cooperative, would include the hatchery function, control over the growth and time to market birds on the farm, processing, and moving the birds to the consumer. The proprietary handler may maintain title to the birds and contract poultrymen to grow the birds. In this case the farmer is guaranteed a minimum return for his services. The handler may raise the birds himself and eliminate his dependence upon other poultry meat growers.

If an integrated organization operated in a perfectly competitive market, its maximum profit position would be at the point where $Cm_{(x)} = Ca_{(x)} = Rm_{(x)} = Ra_{(x)}$. Economic surplus accruing to the firm would be zero. The case in question is one in which the firm is operating in an imperfectly competitive market. If the firm were able to lower its average cost curve or raise the market price, it would realize the benefits of increasing the level of the net revenue curve. Although the marketing organization may have marketed a similar number of birds as under the perfect competition model, the net return would be greater under the imperfect competition model. The persistence of this condition would be due largely to the firm's influence on price, ability to maintain the greater efficiency in resource use, and the restriction of new capital in the industry resulting from imperfect knowledge and the relative immobility of capital.

In the case of the cooperative, the farmer probably would receive a higher over-all return if a pooling arrangement were operative. In the case of the proprietary arrangement, competitive conditions, although imperfect, may force the handler to share his economic surplus with the contracted producers. There is a danger that if competition in a given area should become highly imperfect, there might be a decreased incentive for securing increased efficiencies in the integrated system. Also, there is a danger that the integrated organization might extract monopolistic returns from consumers.[1]

A worth-while criterion of evaluation would be the point of location of the firms on the industry average unit cost curve. This would tell us how efficiently the marketing firm is operating for a given scale of operations.

[1] This condition would exist in a market that is well insulated from outside sources of fresh poultry meat—mainly a distance factor.

This analysis would point out whether the firms in the industry were at or near their equilibrium points, and whether the industry was operating at the minimum cost point (the industry economies of scale curve concept is used here).

If the optimum scale of operations is an achieved steady volume which exists under an integrated system, and this organization decides to loosen its hold on its integration powers resulting in scarcity and glut conditions, this particular firm will find its average unit cost rising either to the left or right of the optimum average unit cost position. If the marketing organization vertically integrates in the expansion process, it may more properly choose the necessary physical scale of operations and maintain the economies derived therein. This element of efficiency in resource use should show up in the net revenue function of the organization.

The poultry meat grower is able to evaluate the success of a vertically integrated system by the nature of his net revenue curve and his total net returns. A successful organization should raise the level of the grower's net revenue curve and should enable the grower to market his birds at or near the maximum profit point. An integrated system that incorporates the meat grower should reduce his short-run price uncertainty. Also, the restriction resulting from capital rationing should be reduced through the extension of credit that will permit the proper amounts and combinations of resources to be employed in primary and secondary production at a reasonable cost.

Another criterion that is applicable to all types of vertically integrated organizations is whether a standardized and high quality product has been achieved and maintained. The consumer would consider this criterion in evaluating such a system. Also, it should be determined whether the efficiencies derived from vertical integration are passed on to the consumer in the form of lower prices or increased services, and to the farmer in the form of greater net returns. The degree of competition in both sectors will determine how much of the economic advantages are passed each way.

The degree to which a vertically integrated system is successful would depend largely upon its ability to control its share of the market. It has been implied in other sections of this paper that the integration technique lends itself to monopolistic competition conditions. This may be the case when numbers of firms are considered. However, we cannot overlook the fact that this technique stabilizes the production, processing, and distribution functions of the industry. If properly handled, (a) the knowledge of the primary and secondary producer and the consumers should be made more perfect and (b) all interested groups ought to be made better off through a more proper allocation of resources in the industry producing a superior product for the consumer.

II. W. P. MORTENSON
University of Wisconsin

WEBSTER'S unabridged dictionary defines the word "integration" as "the process of gaining control over the raw materials, manufacture, and marketing of an industry." This would clearly refer to both horizontal and vertical integration, presumably carried forward simultaneously. The process of gaining control over a larger portion of the supply of the raw materials would be horizontal integration, while the process of carrying on *both the manufacturing and marketing* would involve vertical integration.

For our purpose, I shall define horizontal integration as the growth of a firm by the process of adding more and more units engaged on a single stage of the marketing process. Vertical integration I shall define as gaining control of successive stages in the handling or marketing operations of a product through the market channel, from the point of production to that of consumption. Complete vertical integration would thus be achieved if one organization held control of a product through the entire marketing system from the point of initial sale to the ultimate consumer.

Orthodox System of Egg Marketing

Under the unintegrated (orthodox) system of egg marketing (if the eggs are consumed at considerable distance from the point of production), five agencies are usually involved: (1) the local buyer, (2) the central assembler, (3) the wholesaler (or wholesale receiver), (4) the jobber, and (5) the retailer. Under vertical integration, one of these agencies would absorb the functions of one or more of the others. If the process were carried to the point where all the functions were absorbed by the one agency, then we would have complete vertical integration. In most areas we find a condition somewhat between the two extremes.

Trend Toward Vertical Integration

In Wisconsin and apparently in neighboring states, there has been a distinct trend toward vertical integration. In fact, the national grocery chain stores—to mention only one type of organization—are moving rapidly in that direction. Local chains are following suit, although the more common practice with them seems to be that the local chain arranges with a single egg supplier, usually a local country buyer or central assembler, to provide them with their needs.[1] This supplier buys directly

[1] In Wisconsin no local chains of which I have knowledge assemble eggs from farms. However, in towns and smaller cities many of them buy directly from farmers who deliver their eggs to the store.

from producers and performs all the marketing operations up to the retail chain. Under this plan only two marketing agencies are involved—the egg handler and the retailer. This arrangement is perhaps more common where the eggs are consumed within, say, 300 miles of the point of production. For greater distances it becomes difficult and costly for the country buyer to maintain direct contact with the retail outlets.

Vertical and horizontal integration are usually carried forward simultaneously. The handlers who move toward vertical integration also expand horizontally—that is they take on more and more producers—to the point where their supply is sufficient to provide their specific market outlet.

Limitations of Horizontal Integration

There are at least two limitations to horizontal integration at the point of production, (1) the psychology of farmers against monopoly—which would presumably be an outgrowth of complete horizontal integration, and (2) the ease with which new egg handlers can enter an area.

1. *Psychology of Farmers Against Monopoly.*—If a handler took on more and more producers within an area he would attain complete horizontal integration when he obtained the total egg supply from that area.

Let us assume that complete horizontal integration is synonymous with complete monopoly of that area. With complete monopoly a handler could presumably name (or fix) prices—at least within certain limits. Thus, horizontal integration of a local egg handler, who assembled directly from farms, would give him two economic advantages: first, by obtaining eggs from a large proportion of the egg producers in an area, he would assemble a large number of eggs per mile traveled, hence his assembling costs would be relatively low. Second, to the extent that the strong element of monopoly would permit him to fix prices, he could, if he desired, gain a price advantage in buying.

Whether he actually exercised this power or not, some egg producers might be suspicious that he was taking advantage of his situation. Most farmers seem to have a genuine fear of the monopoly power of a buyer of their product, and eggs are not an exception. They prefer to maintain a position where they have a choice of handlers to whom they can sell their product.[2] Thus, if a buyer has even a semblance of monopoly control, or producers suspect that he has, it serves as an aid for a new buyer to gain entrance into an area. It is only natural, of course, that buyers

[2] Many poultrymen, especially those with medium size and small flocks, follow the general practice of changing from one buyer to another occasionally. They are of the opinion that it provides a check by which they can determine which buyer pays the most favorable prices.

entering an area will capitalize upon this anti-monopolistic psychology to gain patrons.

2. *Ease With Which a New Handler Can Enter the Field.*—It is relatively easy for a new egg handler to start in the egg business at the country point. Only a small amount of capital is required to start business as an egg assembler. Anyone, whether or not he understands the egg business, who can finance the purchase of a "pick-up" truck, buy a few egg cases, rent a not-too-well equipped room or building, and have a small amount of capital for the purchase of eggs, can start in the egg business.[3]

The combined result of the fear of monopoly control on the part of farmers, and the ease with which new buyers can enter the area, forces the established buyers to increase their volume of purchases by extending their operations over a wider area rather than obtaining a larger proportion of farmer patrons within an area. While this is a method of horizontal integration, it does not provide the economic advantage of horizontal integration where the expansion is brought about by increasing the volume within a given area.[4]

A study of some 75 egg marketing firms now under way at Wisconsin shows that the firms with the large volume obtain it by covering a large area, not by picking up eggs from a large proportion of the farmers within an area. Their patrons are so scattered that their unit costs of assembling are relatively high. We have found no significant correlation between the size of company and the profit as a percentage of sales. The medium size company seemed to have a slightly higher rate of profit than either the large or small ones. This would suggest that there is little or no positive relationship between the extent of horizontal integration, with scattered routes in an area, and the rate of profit.

On the contrary, there seems to be a distinct positive relationship be-

[3] Those who start business under these conditions are usually not aware of the expense of carrying on the business on a longer time basis. At the start they are concerned mainly in building up volume. In order to do so they are likely to pay producers a higher price than the competitor(s) in the area, and a higher price than conditions warrant, even though such a policy may eventually cripple them financially.

[4] A new handler coming into an area will have to get his supply from producer patrons of established handlers, hence the volume of the established buyers will be reduced. Their costs cannot be reduced proportionally, at least not quickly, consequently their unit costs will rise—generally speaking. In my judgment, there is evidence that farmers are at a disadvantage because of too many, rather than too few egg buyers in most areas of the Midwest. The large number of egg buyers, relatively small in size and inefficient in operation, is tending to widen rather than narrow the margin of handling.

Because of the psychology against the dangers of monopoly, there may be a real question as to whether any handler, assembling directly from farmers, will be able to acquire and hold the bulk of the producers in an area even though it would be to the advantage of the producers if he did so. That is, he will not be able to bring about the amount of horizontal integration which is necessary for highly efficient and low unit cost of operation.

tween the extent of vertical integration and the amount of return to the handler. Those firms which performed all, or nearly all, of the marketing operations from producer to consumer had a noticeably higher rate of return than those which performed only one operation. It also appears that the prices they paid farmers are somewhat higher than the average.

Economies of Vertical Integration

Under a vertically integrated system of marketing, eggs are assembled from the farm, graded and candled, and packed directly into cartons in one operation. Only one grading is made throughout the marketing process–unless eggs are consumed a long distance from the point of production.

A vertically integrated system permits an arrangement under which the marketing process will bring about the elimination of (1) flats and fillers, about ¼ cent per dozen eggs, (2) a second grading, amounting to probably 1½ to two cents a dozen, (3) brokerage fees, (4) usually some cartage at the wholesale or jobber point in the marketing mechanism, and often makes possible the reuse of egg cases. The grading and candling are designed to satisfy the retail trade.

With an unintegrated system, especially if the sales are through open market operations where official grading is used, the central assembler usually grades to meet the official requirements rather than the requirements of the ultimate consumer or of the retail trade. This procedure sometimes necessitates a second grading, whereas under a vertically integrated system, one grading–for the retail trade–might be sufficient.

Suppose, for example, a central assembler packed to the official specification of U. S. Grade A Extras; under this designation 20 percent of the eggs may be lower than Grade A. Eggs graded to minimum requirement of this grade are not likely to satisfy a discriminating consumer trade, hence the eggs would have to be regraded by the wholesaler, jobber or retailer even though quality were maintained through the market route.

Implied Assumptions To Be Considered

In the light of conditions as they appear in Wisconsin and presumably elsewhere in the North Central States, I would like to submit the following assumptions for your consideration:

1. Complete horizontal integration in egg marketing within an area is virtually impossible because of the basic psychology of farmers, and the ease with which new buyers can enter the field. This forces a competitive situation in marketing to the extent of its being wasteful, especially in assembling eggs from the farms and handling them at the first point of sale. Horizontal integration at the producer level will likely come about more slowly than economic conditions would seem to warrant.

2. Vertical integration offers much more possibility than does horizontal integration. It is economically desirable and psychologically feasible, and should be encouraged by marketing specialists.

3. The orthodox, vertically unintegrated, system of handling table eggs is relatively costly and should be discouraged. Even though horizontal integration will meet with noticeable resistance on the part of producers—and perhaps to some extent with dealers—marketing specialists will do well to bend their efforts toward finding new ways of encouraging more horizontal integration where practicable. The economic advantages of vertical integration are so clear-cut that there can be little doubt that it should be encouraged wherever possible.

SUMMARY OF DISCUSSION

The assumption that farmers' attitudes toward monopoly generally hindered horizontal integration was discussed at some length. There appeared to be fairly general agreement in the group that farmers' reactions against monopoly were not particularly pronounced when pertaining to instances of horizontal integration in egg and poultry organizations dealing with farmers. It was pointed out that limited research studies indicate that general farm flock producers tend to "stick with" one buyer.

The effect of ease of entry into business appeared to be a more important consideration in egg marketing than in poultry processing, because of the higher investment costs of poultry processing equipment.

Among the prerequisites to vertical integration were a good standardization program and contractual agreements among buyers and sellers. The contractual relationship with the retailer was considered a factor of importance in the successful integration of planned fryer operations.

Fewer gradings resulting in lower costs appeared to be a positive benefit of vertical integration in egg handling. Generally acceptable standards need to be employed as one means of achieving a high degree of vertical integration. Finding a means or mechanism to supplant the present price system in the event of complete integration of the egg industry was discussed. An acceptable solution to the problem was not readily apparent.

The group was urged to evaluate and analyze possible additional costs (such as relatively high feed costs) as well as possible savings involved in a high degree of integration before making definite recommendations for adoption of such arrangements without some qualifications.

AN ANALYSIS OF STATUTORY MARKET CONTROL PROGRAMS IN THE CALIFORNIA-ARIZONA ORANGE INDUSTRY*

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THIS thesis on which I am reporting is certainly not the first report on the California orange industry—nor will it be the last. In the present context it is a small part of a broad investigation being conducted at the University of California on market control. The orange industry is one in which market control has been extremely important.

An earlier study completed by George Mehren in 1942 had analyzed the experience of the industry in the period of voluntary market control which operated up to 1933. My job, then, was to analyze the experience of the industry beginning in 1933 with compulsory, universal market control under the force of law.

In doing this job, I learned something that has been emphasized by speakers in almost every marketing discussion—that is, to answer all the questions that arise in practically every marketing problem, the services of many disciplines are required. And in this investigation I found myself being lawyer, political scientist, political economist, economic theorist, and econometrician. To indicate how all this was integrated and the results were obtained is the real intent of this short report.

An analogy may be made here between the analysis of the thesis problem and the slicing of an orange. As you know, an infinite number of slices may be made in the vertical dimension. A like number of slices may be made in the horizontal direction. An infinite number of slices may also be made in the numerous oblique directions. There are probably almost this many dimensions in the analysis of compulsory market control in the orange industry. The choices among them would number at least as many as the researchers who might tackle the problem. Fortunately for you, and myself, I chose only three dimensions for consideration—legal, administrative, and econometric.

I. Legal

The reason for selecting the legal dimension is simple. It was through the instrumentality of law that these programs were made universal and compulsory. Economic variables were affected because of this fact.

Two conclusions are noteworthy here with reference to the dissertation. The first is that a compulsory, universal market control program

* Summary of award-winning Ph.D. thesis, "An Analysis of Statutory Marketing Control Programs in the California-Arizona Orange Industry" filed at the University of California.

under legal authorization is more effective than a voluntary program, in enabling the industry as a whole to enhance its returns. The reason for the breakdown of the previous voluntary programs was that unaffiliated shippers benefited disproportionately to those who restricted shipments and held the price umbrella. Statutory control requires that the burdens of control be borne by all.

The second is that the effectiveness of economic operations of California-Arizona orange growers in attempting to enhance their returns through statutory market control was seriously attenuated by legal considerations. The reason for this lies in the tentative nature of the early statutes, the subsequent amendments to these statutes, and the doubtful validity of some of the control instruments themselves. It was not until the basic legislation became thoroughly tested in court cases for its constitutionality that the programs could be efficiently administered. The evidence for this was found at both the state and federal levels of control.

II. Administrative

The next way statutory market control was sliced was through the administrative dimension involving the following segments—enforcement, equity, and regulation of shipments. The economic significance of this dimension is that it is here that the price and returns affecting variables are manipulated by the Orange Administrative Committee through the Secretary of Agriculture. The services of both economist and political scientist are necessary to analyze this slice of the problem.

Enforcement—One of the administrative problems is that of enforcement. It is obvious that unregulated shipments could greatly restrict the effectiveness of the program. It is less obvious perhaps, except to an economist, why shippers seek to violate the regulation if, in fact, it results in enhanced returns to the group. The explanation appears to lie in the large number of producers and the terrific pressure which they exert on shippers. In the jargon of economics, we would say the average revenue curve facing the individual is seen to be perfectly elastic. His entire crop appears to be such a drop in the bucket relative to the total crop that whether he ships or holds can have no influence on price. The individual does not appreciate the fact that, while this is true in isolation, the concerted shipments of many producers can and do have an effect on price.

In general, enforcement has been effective in the federal program. Lack of adequate enforcement in the intrastate market control program was one of the important reasons for its failure on the state level.

Equity—Another administrative problem relates to considerations of equity. Although in so far as I know, equity does not appear in Boulding, or Bowman and Bach, or Stigler, as a legitimate economic concept,

nevertheless, it is of strategic importance in analyzing the experience of the orange industry with market control.

Equity is important economically because it means that the industry must accept something less than the maximum total returns they might receive if equity were not required as a consideration. This is the equivalent of saying that another constraint has been introduced into the set of equations. An attempt is made to maximize total returns subject to the first constraint, which is market demand, and the second constraint, which is equity.

The industry has adopted an operational definition of equity. The rule is that every producer should have opportunity to ship the same proportion of his crop as the average proportion shipped by all producers. I shall not explain the variety of ways which have been proposed, tried, discarded, and those currently in use for solving the equity problem. It is extremely difficult administratively to give every producer equality of opportunity to ship, when differences exist in areas, varieties, maturities, weather hazard, storing qualities on tree, and so on.

An interesting legal sidelight is presented in these considerations of equity which may cause the economist and political scientist to step aside for the moment. As desired by the industry, equity involves exemption clauses within the over-all regulation so that each producer can ship the same percentage of his total crop. This is consistent with federal interpretation, which holds that if individuals did not receive equal opportunity to ship, the program would not be equitable.

However, the State of California considers that a program is equitable if it is reasonable and bears a reasonable relationship for effectuating the law and the program. Any exemption clause would tend to indicate that, at least for some individuals being regulated, the program was not reasonable and proper. Therefore, exemption clauses are not allowed in state programs. This proved to be an important reason why programs to control shipments within the State under state legislation invariably failed, and the market was unregulated.

Regulation of shipments—Actual regulation of shipments by the Administrative Committee is the third phase of administration of the program. Prior to actual regulation, the management side of the Administrative Committee has made estimates of the total tree crop and its size distribution, has determined what shippers have control over parts of the crop, has calculated every shipper's prorate base, has provided for exchanging allotments, and has provided for paying expenses and collecting assessments.

Actual regulation begins with a statement of shipping policy at the outset of the shipping season by the Committee. After taking note of

total tree crop, monthly utilization, monthly fresh shipments in both interstate and intrastate commerce, and weekly schedule of shipments based on average percentage of total shipments in each week in the past five years, the Committee announces its price objectives and how it hopes to achieve them.

The one method of regulation which has been continuously available to the Committee is control over weekly shipments to the fresh market. This is the sole outlet and sole time period over which they exercise authority. However, shipping more or less in the fresh outlet determines what goes to the processed outlet; and rate of flow regulation of weekly shipments can result in seasonal limitation. Thus, the Committee's power through the Secretary of Agriculture is quite substantial in affecting economic variables.

It does not appear, however, that the Committee uses this power to maximize *short run* returns to the industry. There are two reasons for this. The Committee seems to have learned that following a policy of short run maximization can result in a price so high that oranges are priced out of the market. This results from the fact that consumers almost always have alternative goods on which to spend their incomes. Too high a price for oranges may induce them to shift to substitute commodities, perhaps for an extended period of time. This is a case of temporal interrelatedness of demand.

Short run maximization is also not possible because of lack of homogeneity of interests within the composition of the Committee reflecting industry attitudes. Every decision of the Committee is a result of compromise among the dominant shipper, which is a cooperative, a much smaller cooperative shipper, and the private shippers. Committee representatives tend to be prejudiced toward their own organizations. Because of the great diversity among organizations, their interests rarely tend to coincide; thus joint maximization is impossible.

The focal point of interest to the political scientist here is the reconciliation of interests within the Control Committee. To the economist the focal point may well be the conceptual joint maximization which is consistent with maximum total returns to the industry through use of this monopoly control device. The researcher who attempts to combine both of these points of view can hope that he does not fall down into the cracks between them.

III. Econometric

The third dimension, or slice, of the orange market control problem may be termed "econometric." It involves that kind of exploratory work highly desirable and probably necessary before quantitative analysis is undertaken in economic problems.

This kind of exploration requires the joint efforts of the economic theorist, the statistician, and the marketing specialist. The objective, of course, is to establish meaningful hypotheses which can be tested. These hypotheses should be cast in terms of variables which have some *a priori* validity and can be defined operationally. Conceptually there are many categories in which the effects of market control may be analyzed, such as price, cost, profit, and even welfare. These may be applied to various groups such as producers, marketing middlemen, and consumers. However, for statistical analysis, the variables which may be used are limited because it must be possible to take measurements on each variable.

Another limiting factor from the researcher's point of view is lack of an integrated theory, with operational usefulness, of multiple products, multiple spatially separated markets, and multiple time periods where there are interrelationships among the products, the markets, and time. At present we have pieces of such a theory, yet this is the kind of theory which is needed for many marketing problems, of which the orange industry is an example.

Statistical considerations limit further what can be done with a problem as complex as this. For various reasons it appears that the simultaneous equations approach would be preferable to a single equation approach in measuring these relations.

Statistical analysis of the use of market control in the orange industry requires data not yet available at the various levels of distribution, primarily at retail. When available, data will be required for the multiple product, which includes California fresh oranges and all competing products, such as Florida oranges, apples, bananas, grapefruit, canned juices, and frozen juices. Data will also be required on the multiple outlet, which includes different uses, different sizes, different grades, and different time periods. The multiple area includes California-Arizona and Florida-Texas.

Of the many possible hypotheses which might be examined, certainly two should be stated here, for they constitute the basis for the operations of the Control Committee. The first is that total returns to the industry may be increased by limitation of seasonal shipments in the fresh outlet. The second is that there exists a temporal interrelationship among weekly demands in the fresh market, so that regulation of weekly shipments can maintain an optimum level, and/or shape of subsequent weekly demands in order to increase returns to the industry.

When statisticians finally obtain estimates of the structural parameters of these demand relationships, economists will be better able to evaluate the use of statutory market control for economic gain.

In conclusion, I wish to repeat that the purpose of this report was to

tell the story of how one individual attempted to integrate the principles of several disciplines into an analysis of statutory market control in the California-Arizona orange industry. Although my dissertation ended with an economic model for the statistician, the analysis of statutory market control does not end with the statistician. Finally, as the series of analyses of market control are completed, commodity by commodity, there will be that gigantic task of combining them into an analysis of general validity with whatever policy implications are involved. Here, integrated analysis is vital.

FARM TENURE PROCESSES IN SOUTH DAKOTA*

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THIS thesis is a progress report on a preliminary investigation. It is not a final summary of a job completed. The setting and circumstances which caused it to become what it is are described briefly in the following paragraphs.

South Dakota is an agricultural state which sprawls across the Great Plains transition from Corn Belt to arid lands. It is characterized by rich soils, variable weather, and an extensive, high risk agriculture. The State was settled between 1850 and 1920 under federal laws which were intended to cover the expanse with 160-acre, family type owner-operated farms. The land, the climate, and the economic situation combined to thwart this purpose. The percentage of tenancy rose for 50 years and reached 53 percent in 1940, farm numbers decreased steadily after initial settlement, farm sizes increased, and tenure problems multiplied.

In 1947 the Agricultural Economics staff at South Dakota State College decided to initiate more intensive study of farm tenure. Before this, there had been studies by the department on landlord-tenant relations and on certain general aspects of tenure.

It was decided to study three problems which were of current interest to farm people and the research staff. These were stated in the form of objectives:

A. To gain a better knowledge of processes by which South Dakota people acquire and dispose of rights in land.

B. To determine which means and procedures will best serve farm families wishing to transfer their farms within their families.

C. To estimate the tenure implications of possible shifts from the present farming patterns in east-central South Dakota to irrigation farming.

The planning of this project was conducted along the lines of research methodology studied at the 1946 Land Tenure Workshop. An effort was made to reason through from problem to hypotheses to evidence on each of the three major lines to be investigated. A plan of work was prepared and a limited amount of pre-testing was accomplished prior to intensive field work.

Information was sought by personal interview or mail questionnaire from three samples of people. Sample One included all individuals who

* Summary of award-winning Ph.D. thesis, "Farm Tenure Processes in South Dakota" filed at Cornell University.

had, or had had, tenure rights in land within selected sample blocks in eight counties scattered over the state. From these, 144 usable detailed tenure history schedules were obtained. Sample Two included any families located who had kept land for three or more generations, or had special transfer arrangements. Seventeen such families furnished 52 individual tenure histories. Sample Three included all members of the South Dakota Bar Association. Two hundred twenty-two of the members returned information on their experiences with intrafamily transfers of land.

Tenure Processes

The tenure histories were analyzed by the case grouping method and by comparison of case groups. The "agricultural ladder" was taken apart for the purposes of this study and treated as two, an occupational ladder and a tenure ladder. In addition, modifying factors, such as marital status and the family cycle, were introduced. The cases were grouped according to the occupational ladders followed through life, and then studied for tenure patterns and other characteristics. Principal emphasis was placed on study of those cases with 50 or more years of history.

It was found that, although there were numerous and diverse occupational sequences among the respondents, most of the traffic had been over the same few routes. About one fourth of the men had gone from work on the home farm as unmarried men into farm operatorship and matrimony simultaneously, generally as farm owners or part owners. Approximately half had in one way or another made the jump from parental farm to farm operatorship without having been hired men on other farms or nonfarm workers.

A consistent relationship between occupational ladder and tenure ladder did not appear to exist. There was some indication that those men who worked on the home farms until they married and then went out as farm operators more often started as owners, whereas those who became farm operators as unmarried, generally younger men, more often started as tenants.

Regardless of the tenure status in which they started farming, the great majority of those who stayed in farming as operators became owners or part owners and maintained that status.

Most of the land acquired by the respondents had been obtained from nonrelatives. Only nine percent of the total land acquired had come from relatives. A similar situation existed with regard to land relinquished by respondents. Only about one land owner in 10 had any plans for the disposition of his farm to the next generation.

Intrafamily Transfers of Farms

Although intrafamily farm transfers had played a relatively small part in the tenure histories of the respondents, there were some indications that these arrangements were growing in importance over time; there were increasing numbers of requests for information on the subject. From the information obtained from all three samples, it was possible to evaluate in general terms the various factors which affect family arrangements for succession in farming, and the different methods or devices commonly used for transfers.

There seem to be tangible reasons why some farm families desire to keep the farm in the family. Of course, there is little reason to make the effort to do so unless the farm business is adequate and the family includes an heir who is willing and able to take it over. In addition, the family should be willing to discuss the problems involved and to arrive at a workable arrangement at a time, before the death of the parents, when such an heir is ready to enter the business.

There are several methods of transferring the farm. These include procedure under the laws of inheritance, use of a will, use of joint tenancy, gifts, and sales. Several legal devices are available for implementation of the methods. It seems that existing law and methodology are adequate to permit the informed farm owner to work out his wishes for transfers.

No one method or device can be recommended for all cases. Each case must be handled on its own merits with regard to family situation, conflicting interests, and with competent legal advice. However, careful consideration of alternatives will help individuals facing transfer decisions to make more appropriate choices.

Tenure Implications of Irrigation Development

A reasonable certainty exists that within the next decade a large-scale irrigation project will be developed to utilize Missouri River water on lands in east-central South Dakota. It is possible to estimate some of the tenure changes which may accompany such irrigation development and to consider the implications.

The proposed irrigation will be superimposed on existing farming and tenure patterns. This undoubtedly will create some tenure problems not yet encountered on a large scale. Among the probable changes and problems will be these:

1. The difficulties of readjusting the present large ownership units to the 160-acre maximum under reclamation laws.
2. The processes necessary to readjust tenure as the physical units are converted from rectangular survey to irrigation tracts.

3. The addition of water rights, special loan privileges, possible production quotas right to the existing bundle of farm tenure rights.
4. Special problems of fitting various types of public lands into the irrigation patterns.
5. The difficulties which some ex-dryland farmers will have in adjusting to irrigation practices, causing turnover in personnel and requiring additional educational measures.
6. Changes in type of farming probably requiring changes in rental contracts and arrangements.
7. The increasing of labor requirements and the consequent changes in labor arrangements and contracts.

It is possible that such a project will start with a high proportion of nominal owners. This matter will depend on policy decisions not yet made concerning the development of the project lands. Even if started with all owner-operators, the action of economic and social forces probably will again increase the proportions of tenants and part owners.

General Conclusions

The farm tenure situation in the State seems to be more satisfactory in at least one aspect than it has been generally considered to be. The evidence would indicate that the farm people have been working rather successfully at the task of attaining farm ownership, but have been neglecting other tenure matters such as landlord-tenant relationships and succession to their farms.

Tenure processes are complex; we still know too little about them. We do consider it unlikely that tenure problems can be solved in any easy or simple manner. This thesis includes a chapter on "Unfinished Business and Unanswered Questions." In South Dakota we are continuing the study with a somewhat better view of our tenure problems obtained by this preliminary investigation.

APPLICATION OF ECONOMIC THEORY TO FARM MANAGEMENT RESEARCH*

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A THESIS is a proposition maintained by argument. The thesis developed was that a constant effort should be made to incorporate advances in the *basic* sciences, particularly economics, in the concepts and methods prevailing in such *applied* sciences as farm management. The argument was triple-barrelled. The first was a description of the historical development of farm management. The second was a review of the contributions of economic theories, especially dynamic economics. The third was a field survey designed to explore some empirical problems in the application of dynamic economics in farm management. Each of these subdivisions was used to suggest how progress depends on cooperation with other workers, particularly the economists, in the case of farm management.

Historical Development of Farm Management

The development of farm management in the past has depended on the combined efforts of agriculturists, economists, and statisticians; and each has enjoyed his heyday as a separate contributor. But now, the need is to combine techniques of the three specialists into a single approach to farm management. Other features of the development of farm management in this country have been the effect of such unique factors as the Land-Grant College System; the Smith-Lever Act, leading to the emphasis on extension work; the Purnell and other acts providing funds for research on a cooperative basis between federal and state agencies; the era of cost-of-production which later matured into the parity-concept era; the AAA and adjustment programs; and the land settlement policy which has resulted in so much private ownership of the farmlands of America. The progress in this country reflects both the trend of historic events and the gradual accumulation of knowledge, so that research workers have been able to expand their interests as time moved on. After the establishment of the uses and limitations of the cost-route, survey, and farm-account-book methods of research, attention shifted as new problems arose. The focus of interest moved from budgeting and outlook to types of farming and interregional competi-

* Summary of award-winning Ph.D. thesis, "The Application of the Economic Theory of the Firm to Farm Management Research with Particular Reference to Recent Advances in Dynamic Economics," filed at the University of Illinois.

tion; from adjustment programs to the economics of soil conservation; from input-output analysis to production functions; from methodology to emphasis on the role of the hypothesis, and more recently the importance of dynamic economics.[1]

Dynamic Economics in Farm Management

In the thesis under review, the definition of dynamic economics originally suggested by Hicks in his *Value and Capital* was adopted. Dynamic economics is concerned with that part of economics where every quantity must be dated. Lately, this definition has been refined, and it has been suggested that Hicks' dynamics involves only a question of "comparative statics." Since progress occurs by little steps, however, even taking limited account of the importance of expectations and attitudes toward risks would add a great deal of realism to the analysis of the position of individual farmers. It was decided, therefore, to settle for this more limited goal, and to leave to the future, and to the mathematicians, some of the more subtle implications of dynamic economics in farm management.

Why, then, is it so important to apply dynamic economics to analyses of farm management data? The answer is a simple one, and one which cannot be denied. The attitude of the farmer toward risk situations, and his judgment of them, are both important factors influencing not only the type of farming adopted, but also the production methods used and the willingness of the farmer to approach the intensive margin envisaged in static economic analyses. The effects of these attitudes toward uncertainty are present, but not analyzed, in many data which purport to describe the effects of different factors on the level of farm income.

Reasons for Neglect of Dynamic Economics in the Past

Why, then, has the importance of this subject been ignored in the past? For this neglect, there appear to be four reasons. The first relates to priorities. The incorporation of the effects of uncertainty is a refinement of principles established by analyses of groups of farms. Principles themselves have taken priority over their modifications which are necessary to adapt them to the specific problems of the individual farmer. Secondly, until, say, 15 years ago, there was no economic theory adequate to form a starting point for analysis of the effects of uncertainty on production plans of the individual farms. The third reason was the prevalence of the attitude that since the future was unknown, all that should be done was

[1] A more detailed history of the last 50 years of farm management research, teaching, and extension in the United States, which it is expected will appear in book form, has been prepared by the author in collaboration with Professor H. C. M. Case.

to advise farmers of the outlook and then leave them to decide for themselves what to do about it. A fourth reason was that in the past it has been assumed that the incidence of risk was random in nature. When comparisons of groups of farmers were made, it was assumed that the attitude of farmers toward risk influenced all groups equally. Hence, uncertainty could be ignored when comparisons of the groups of farmers were made.

Let me emphasize that it is *not* suggested that the importance of risks was not previously realized. The earliest writings in farm management in the United States refer to this problem. But it was regarded as being something like the weather. While a lot of people may have talked about it, no one did anything about it.

Review of Reasons for Neglect in the Light of the Present Situation

Each of the four reasons for the neglect of the question is now an anachronism. The time has come to refine analyses so that the added influence of uncertainty can be placed in proper perspective with the other factors influencing differences in incomes between farms.

Take the first reason, that consideration of uncertainty involved a refinement of principles and that the principles were needed more urgently. This was true in the past, but principles of this type are no longer adequate. It is not enough to leave the analysis incomplete by ignoring uncertainty, either in the original analysis used to establish the principles, or in the special application of the results to any one individual farm. It should be possible to develop some generalizations relating to the effects of size of farm, tenure, inheritance experience, age, and education, upon the willingness and ability of farmers to run risks. In the past, the effect of uncertainty as a factor influencing the differences between farms has been ignored in research work. The extension worker has been left to his own devices to modify the general recommendations to fit the problems and preferences of each individual farmer, as he sees him.

The second and third reasons for the neglect of dynamic economics were based on the attitude that little should or could be done about the unknowable future. Variety is the spice of life; the management function and much of the interest in living would largely disappear in the absence of uncertainty regarding the future. But since uncertainty exists, its different incidence on each farmer needs to be considered in determining his efficiency, or in recommending that he adopt a particular method of production. Here the economists come into their own, for they have shown that ignorance of the outcome of a particular event is not in itself enough to destroy all chance of analysis, or to prevent the interpretation

of the different responses of producers to situations of this type. The simplest illustration of this kind relates to the translation of the expected prices used in dynamic economic analysis into a "certainty equivalent" which enables one to apply static economic principles. Expectations of producers must be incorporated in a dynamic analysis, and an attempt may be made to express price expectations of each producer in a form equivalent to the single price used in static analysis. Thus, if a producer expects that there are two chances in 10 of a price of, say, 80 cents, two in 10 of a price of 90 cents, four in 10 of a price of $1.00, and so forth, a "certainty equivalent" can be estimated. This is done by forming a mean of these different price expectations by weighting according to the likelihood of price at each level. Thus, the 80 cents would be weighted by two, the 90 cents by two, the $1.00 by four, and so on. The catch is that it is difficult to get farmers to express expectations in this way; and if they did, they would probably not make the total chances add up to 10 . . . which confuses things, to say the least. This is one example of the need for empirical data to develop the work of the economists in evolving a theory of dynamic economics.

The fourth reason for the earlier omission of dynamic economics in the interpretation of farm management data has been the implicit assumption that the incidence of uncertainty is random, and that it can therefore be ignored in analyses of farm data when comparisons of groups of farms are made. A grouping of farms may be established on the basis of tenure, or size of farm, or according to whether or not a farmer adopted a particular practice. Then if any difference in net returns, for example, between the groups is observed, it is often attributed to the *recorded* difference between the groups, which was whether the farmer "did" or "did not." But it may well be that whether the farmer "did" or "did not" is itself determined by, or associated with, his reactions to (his estimates of) the risks which are implied in the adoption of the practice. Unless some account is taken of this influence, the extension worker may receive a very poor reception when he recommends to those who "did not" that they should adopt the practice.

This, then, is a thumbnail sketch of the background. What can empirical research do to develop and apply these ideas to practical farm management problems?

The Need for Empirical Data

The great need is for more data relating to the ways in which farmers arrive at their expectations and to the ways in which these expectations influence their plans. In the survey included in this thesis[2] farmers did

[2] D. B. Williams, "Price Expectations and Reactions to Uncertainty by Farmers in Illinois," *this Journal*, Volume XXXIII, No. 1, February 1951.

not express clear-cut single-value price expectations. They preferred to indicate a range of possible prices; in 25 percent of the cases the single value expressed was at one extreme or the other of the range of possible prices stated by the farmer. Twenty-four of the 161 farmers would not express a single most probable price at all, but would indicate only an expected range. A vital problem in this regard is: how do farmers add together the different possible results so as to compare alternative production plans, each of which has uncertain outcomes?

Another problem is the measurement of attitudes toward uncertainty situations. The method used was to pose a series of questions, presenting a choice between a sure result and a chance result, with a chance return of 50 percent above or below the sure result. Thus the farmer could, at one stage of the interview, choose between (1) a sure $1,000; and (2) an equal chance of $1,500 or $500, depending upon the toss of a coin. The farmers were then classified according to their choice of the sure or chance alternative, and an attempt was made to show that associations existed between their answers to the questions and such factors as tenure, capital supplies available, age, education, and other characteristics. The purpose of this analysis was to establish that the assumption of random incidence of uncertainty is invalid, and that farmers express different attitudes or preferences in accordance with other observable characteristics . . . particularly the farmer's education, age, and the year he started farming. Some problems of technique were involved, especially with regard to levels of significance under the chi square test. If a higher level than five percent significance is acceptable, then there appears also to be some association with capital invested, inheritance experience, and the level of price optimism displayed by the farmer.[3]

In conclusion, the discussion has outlined the importance of economic theories in farm management, using an historical review to show their importance in the past, and the example of dynamic economics to suggest their importance in the future. These ideas may suggest a new emphasis in farm management research to take more account of the problems and attitudes of individual farmers.

[3] For details of these results see *Ibid.*, especially pages 30-35.

MINUTES OF THE MEETING OF THE EXECUTIVE COMMITTEE, AMERICAN FARM ECONOMIC ASSOCIATION, GUELPH, ONTARIO, CANADA, JULY 25, 1951

The meeting was called to order by President F. F. Hill at 8:45 A.M. Others present were Past-President O. V. Wells, Vice-President Ray G. Bressler, Jr., President-Elect George H. Aull, H. K. Leckie (representing H. Van Vliet, President of C.A.E.S.), C. W. Vrooman (representing R. T. Burdick, President of W.F.E.A.), Editor Walter W. Wilcox, and Secretary-Treasurer L. H. Simerl.

L. H. Simerl, as Chairman of the Investment Committee, which also includes Asher Hobson and L. J. Norton, reported the actions of that committee during the year. George Aull made and O. V. Wells seconded, a motion approving the actions of the committees. The motion was adopted.

R. G. Bressler made, and O. V. Wells seconded, a motion to authorize Hill, Wilcox, and Leckie to work out arrangements for printing the proceedings of the current joint meeting of C.A.E.S. and the A.F.E.A. The motion was approved.

The committee discussed ways and means of improving the Special Awards program by providing greater recognition of winners at the annual meeting. It seems desirable to move the schedule ahead so that awards can be determined earlier. Walter Wilcox suggested, and a motion was made and seconded, to present awards at the banquet. The motion was approved.

W. Wilcox suggested and a motion was made and seconded recommending that the incoming President appoint a committee to review and compare advertising rates in the Journal with a view to revising them. Approved.

There being no more business to come before the committee, the meeting adjourned.

L. H. SIMERL, *Secretary-Treasurer*
(Approved July 26, 1951)

MINUTES OF THE ANNUAL BUSINESS MEETING, JULY 26, 1951

President F. F. Hill called the meeting to order at 3:30 P.M. and presented his report for the year.

The President called for and received in succession reports from the Election Tellers, the Secretary-Treasurer, and the Auditors. These reports are appended to and form a part of these proceedings.

The reports of the Secretary-Treasurer and the Auditors were accepted and approved.

At the request of the President, Herman Southworth told of the progress being made on the book of readings in agricultural marketing which is to be published by the Association.

Ray G. Bressler, Jr., presented the following resolution and moved its adoption:

"For the past three days we have been enjoying the hospitality of the Canadian Agricultural Economics Society and of the Ontario Agricultural College. We need not dwell at length on the excellent facilities, the smooth and efficient arrangements, the picnic and pipers, and the strong feeling of sincere friendliness. We are all glad to be here, and we heartily approve of this joint meeting of our two associations. We want to express our gratitude for these many favors, and to that end we express our sincere thanks to the staff and administration of the Ontario Agricultural College, to the Canadian Agricultural Economics Society, and especially to the committees that have made our visit so enjoyable.

"We direct that this expression of thanks be spread on the minutes of this meeting, that our Secretary transmit the sense of this motion to the College and the Society, and that it be carried directly to our friends at the banquet this evening."

The motion was seconded, and the resolution adopted by a unanimous vote.

O. V. Wells moved that the Association express its appreciation to the Heads of Departments at the University of Wisconsin and the University of Illinois for permitting members of their staffs to serve as Editor of the JOURNAL OF FARM ECONOMICS and Secretary-Treasurer, respectively. The motion was seconded and carried.

E. L. Butz made, and C. L. Stewart seconded, a motion that the Association establish a custom of having a presidential address as a feature of the program of the annual meeting. The motion was discussed freely, especially by Past-Presidents. Consensus was that the proposal had much merit, but many felt that the President had enough responsibilities in preparing the program. Some thought that such an address might better be given by the President-Elect. The motion was lost.

Harry Trelogan moved that the membership recommend to the incoming officers the installation of a modern system of membership and business records. The motion was seconded and approved.

President-Elect George Aull announced that the next annual meeting would be held at the University of Illinois, Urbana, Illinois, August 28-30, 1952.

The meeting was adjourned.

REPORT OF THE PRESIDENT

There have been a number of developments of interest in the Association during the past year. We were all shocked and saddened last fall to learn of the untimely death of Warren Waite, our Past-President. In his quiet, unobstrusive, but highly effective way Warren contributed much to agricultural economics as teacher, research-worker, and author; and to this Association, as Editor of the *Journal* and during his last year as President. We are all the poorer for his passing.

During the year, work was started on a book of *Readings on Agricultural Marketing*. Despite his heavy schedule, we were able to get F. V. Waugh to serve as Editor with an advisory committee consisting of the following persons:

L. A. Bevan	W. H. Nicholls
J. D. Black	Harold Rowe
M. E. Brunk	G. S. Shepherd
Sidney Hoos	H. M. Southworth
J. G. Knapp	F. J. Welch

Work was started early this year and real progress has been made. I am going to ask Herman Southworth to give a progress report on this undertaking a little later on. I have no doubt that this volume will fill a real need and be as great a financial success as the book of *Readings on Agricultural Policy* edited by Oscar Jesness and associates. As of June 30, 1951, 2,743 copies of the latter book had been sold. This was sufficient to cover the costs of the first edition and return a profit to the Association.

One of the highly successful ventures of the year was the membership campaign directed by Vice-President Shepherd, who was assisted by one or more persons in every state and the District of Columbia. As a result of this campaign, the number of members and subscribers increased from 1,984 as of June 30, 1950 to 2,255 as of June 30, 1951, a gain of 271. This increase of 271 members and subscribers during the past year compares with a decrease of 51 during the seven months ending June 30, 1950—the latest preceding period for which comparable figures are available.

The current marginal cost of printing the *Journal* under the new contract and format is estimated by the Editor to be between $1.60 and $1.75 per member. Using a figure of $1.75, and an average membership and subscription fee of, say, $4.50, leaves $2.75 from each new membership to help pay other operating expenses. In view of rising costs, it is of the greatest importance that we make a continuing effort to maintain a membership well in excess of 2,000. I should like to see the Association set as a minimum goal the attainment of a membership sufficiently large so that in most years, at least, we can pay current operating expenses from member and subscription income, without having to rely on dividends and interest from investments to balance our budget. During the fiscal year just closed we were about $100 short of meeting this goal on a cash basis; on an accrual basis we were no doubt several hundred dollars short, although exact figures on an accrual basis are not available. Quite aside from the question of income, I should like to see the Association maintain a large membership from the point of view of getting the *Journal* in the hands of the largest possible number of people.

Early this year, the Editor was authorized by the Executive Committee to make changes in the format of the *Journal*, in consultation with the printers,

which served to hold down what would otherwise have been a 10 to 11 percent increase in printing costs. This was done in such a way that, from my point of view at least, the *Journal* is still an attractive and readable publication.

The Secretary-Treasurer has striven to hold down other operating costs in every possible way. We should not overlook the fact that the University of Illinois has made another substantial contribution to the Association—this is the fifth—in the form of various free services provided the Secretary-Treasurer, not to mention the time which he has devoted to Association affairs.

Looking ahead, we exercised the authority granted by the membership at the annual meeting held at Laramie, Wyoming, in 1949, and charged a $2.00 registration fee for the present annual meeting. I hope this will be sufficient to take care of all expenses in connection with the present annual meeting, with perhaps something left over.

I am glad to report that our operating statement for the year ending June 30, 1951 shows a net gain, including income from investments, of approximately $2,000. However, as the Secretary-Treasurer will point out in his financial report, a number of adjustments in this figure are necessary to obtain a true picture of financial progress during the year. First, we were in the process of converting membership periods from years beginning April 1, July 1, October 1, and January 1 to a uniform calendar-year basis. In the process, some members paid for as many as 15 to 18 months ahead. Since our books are kept on a cash basis, the full amount of these payments was credited directly to income, which means that in these cases we collected dues for a year and a quarter or a year and a half, whereas we incurred offsetting publication and other expenses for only 12 months. The membership campaign to which I previously referred created a similar situation. In this case, our statement reflects the collection of membership dues for a full year, but does not reflect a full year of offsetting expenses. Nevertheless, after allowing for adjustments of the kind just described, our operating condition improved substantially during the year.

To turn to other matters, E. C. Young consented to serve as Chairman of our Awards Committee for a second year, and Harry Wellman, L. J. Norton, Harry Trelogan, T. K. Cowden, and Herman Southworth served a second year as members. The new members on this important committee are W. G. Murray, O. C. Stein, Earl Heady, H. G. Hamilton and K. H. Parsons. Service on this committee involves real work, and lots of it, and I am deeply grateful to its members, especially the six men who served for two years in order to establish continuity and place the procedures followed on a firm basis.

Last year, President Waite reported that Joseph Ackerman had done an excellent job in working with the student chapters of the Association, but that there were still unsolved problems in this area. One of the difficult problems, of course, is that of developing continuity in handling these matters. Our approach to this problem during the past year was simply to convince Mr. Ackerman that he should continue to work with the student chapters during 1950-51. Needless to say, he did a good job again this year, but we have not arrived at a satisfactory solution to the basic long-term problem of how to organize this activity so that it will function smoothly and effectively on a national basis, year after year. This job I pass on to the new President.

We have made, or are in the process of making, the usual arrangements for joint meetings with the American Economics Association and the American Statistical Association.

In closing, I want to express my sincere appreciation of the cooperation I

have received from other officers of the Association and from the membership. I have no way of knowing exactly how many persons participated in the membership campaign. Certainly, it was a substantial number and many of them put in a great deal of time and energy on the job, especially Vice-President Shepherd, who organized and directed the drive.

After completing the job of editing the *Proceedings* of the 1951 annual meeting and the November issue of the *Journal*, Walter Wilcox retires as Editor after three years of service. Needless to say, the Association is greatly in his debt for the excellent job he has done. We have been fortunate in obtaining the services of Lawrence W. Witt, of Michigan State College, as his successor.

The Secretary-Treasurer of an organization such as this inevitably carries a large part of the load. Not only is he responsible for his own work as Secretary-Treasurer, but, during the past year at least, he has had to spend time trying to keep the President straight concerning operating policies and procedures. L. H. Simerl, our present Secretary-Treasurer, who has worked tirelessly at the job, is retiring from office after three years of service. Don Paarlberg of Purdue has consented to succeed him.

Fred Waugh and his committee, Ernest Young and his committee, Joseph Ackerman and other members of the American Association also have made outstanding contributions. Professor High, of Ontario Agricultural College, and his committee handled all matters pertaining to local arrangements, and Mr. E. P. Reid of Ottawa and his committee, all publicity matters. The Program Committee of the Canadian Society, of which Professor G. L. Burton, of Macdonald College, was Chairman, cooperated whole-heartedly in developing the joint program.

To these persons and to all others who have worked on the affairs of the Association during the past year, I want to express my sincere thanks.

F. F. HILL, *President*

200 Bay Street
Toronto 1, Canada
August 21, 1951

Dr. G. H. Aull, President,
American Farm Economic Association,
Clemson Agricultural College,
Clemson, South Carolina, U.S.A.

DEAR DR. AULL:

We sincerely hope that the large number of members of the American Farm Economic Association who were able to make the trip to Guelph enjoyed the meetings and their visit to Canada.

I am pleased to advise you of the following resolution which was approved at the annual meeting of the Canadian Agricultural Economics Society:

"*Resolved,* That the Society is very appreciative of the opportunity of meeting jointly with the American Farm Economic Association, and is pleased to have been able to arrange for the American Farm Economic Association to hold this annual meeting in Canada. The Society also appreciates the wholehearted co-operation of the American Farm Economic Association in planning all aspects of the program."

Yours sincerely,
H. K. LECKIE, *President*
Canadian Agricultural Economics Society

REPORT OF THE ELECTION TELLERS

We, the Committee of Election Tellers appointed by the President, F. F. Hill, have examined and counted the ballots returned by Association members to the Secretary-Treasurer and turned over by him to us. A total of 879 ballots was returned. The following persons were elected for the coming year:

President-Elect ..... H. R. Wellman
First Vice-President ..... M. M. Kelso
Second Vice-President ..... H. B. James
Secretary-Treasurer ..... Don Paarlberg

Respectfully submitted,
FLOYD HEDLUND
C. D. KEARL
E. H. WEICKING
GEORGE W. WESTCOTT, *Chairman*

REPORT OF THE SECRETARY-TREASURER

Last year I suggested that we might get our long awaited membership campaign under way by appointing a 100-man committee. President Hill adopted the idea in principle, and made First Vice-President Goeffrey Shepherd chairman. Serving with him were the heads of the departments of agricultural economics in our colleges and universities and the principals of numerous government agencies.

The membership campaign was highly successful. Net membership was increased by 247, as compared with a net membership loss of 51 for the previous year.

A tabular summary of changes in numbers of members and subscribers follows.

NUMBER OF MEMBERS AND SUBSCRIBERS, JUNE 30, 1950, AND JUNE 30, 1951

	June 30, 1950	June 30, 1951	Net change
Regular members	1,279	1,515	+236
Junior members	160	149	−11
United States libraries and firms	313	307	−6
Foreign libraries and firms	220	272	+52
Exchanges	12	12	0
Total	1,984	2,255	271

I should like to call the attention of members to the subscriptions for libraries and corporations in foreign countries. In addition to these, we have 180 individual members outside the U.S.A. and Canada. Altogether, the JOURNAL OF FARM ECONOMICS is now regularly read in more than 60 countries. Thus, results of research published in the *Journal* are literally carried around the world.

The increase in members and subscribers is reflected in the financial reports for the year. The income and expenditures during the year and the financial condition at the end of the year are shown in the following statement.

INCOME AND EXPENSE STATEMENT
JULY 1, 1950, TO JUNE 30, 1951

Operating income		
Dues and subscriptions	$11,414.64	
Back numbers	542.08	
Reprints	1,438.21	
Advertising	200.00	
Annual meeting	538.20	
Other	105.77	$14,238.90
Operating expenses		
Journal printing	11,452.38	
Back numbers	660.00	
Postage and wires	375.81	
Annual meetings	613.83	
Editorial expense	742.00	
Office supplies	268.33	
Other	222.98	14,335.33
Operating loss		96.43
Dividends and interest		2,170.22
Net gain		$ 2,073.79

FINANCIAL STATEMENT
JUNE 30,1951

Assets		
Cash in bank	$ 6,335.16	
Bond interest coupons	300.00	
Stocks	27,697.12	
United States Government securities	38,984.00	$73,316.28
Liability to special grants fund		13,475.96
Net worth		$59,840.32

ADJUSTMENTS IN NET WORTH

Net worth June 30, 1950		$56,881.80
Add: Net gain	$ 2,073.79	
Appreciation of stocks	992.40	
Appreciation of bonds	25.75	
	$ 3,091.94	
Less interest credited to special fund	133.42	2,958.52
Net worth June 30, 1951		$59,840.32

A word of comment concerning the financial report should be made. Payments from the new members and subscribers are shown as income for the year ending June 30, 1951, but they have not as yet been given a full year of service. Furthermore, during the year some members paid for more than 12 months in response to our efforts to adjust all memberships to a calendar year basis. These payments made our income unusually large in relation to our expenses.

Looking ahead, it appears likely that printing costs will be somewhat greater in the coming year than they were in the year just ended. This, together with the prospect of reduced income, suggests that the next financial report may be considerably less favorable than the report for June 30, 1951.

L. H. SIMERL, *Secretary-Treasurer*

REPORT OF THE AUDITORS

At the request of the President of the American Farm Economic Association, we have examined the accounts of the Secretary-Treasurer, L. H. Simerl, for the period, July 1, 1950 through June 30, 1951.

We have checked all disbursements against canceled checks and the totals of each deposit slip against bank statements; income and expense items have been traced to their individual accounts, and the total of each account has been verified. We also checked the Treasurer's report of income and expenses and the financial statement for the period indicated, and have found that they reflect with accuracy his records of the transactions and the financial position of the association.

We made an examination of the securities belonging to the Association July 14, 1951. Everything was found to be in order in the bank box.

Suggestions for the future are two:

1. That a special record book of bonds and stocks be instituted, listing each by issue and number, showing dates of purchase and sale, with consideration and cost of acquisition or disposal, with dates within the year of maturity of coupons on bonds, and amounts of interest and of dividends paid. For the investments representing the special awards corpus, a similar detailed record is suggested.

2. That, having brought the changeover to the new fiscal year into effect, the practice be reinstituted in the future of showing with each year's report a comparative series of figures for the preceding fiscal year.

Respectfully submitted,

M. L. MOSHER
C. L. STEWART

MINUTES OF THE EXECUTIVE COMMITTEE MEETING, AMERICAN FARM ECONOMIC ASSOCIATION, JULY 26, 1951

President George Aull called the meeting to order immediately following the annual business meeting. Those present were: George Aull, F. F. Hill, H. B. James, Don Paarlberg, L. H. Simerl, C. W. Vrooman, H. R. Wellman, Walter Wilcox, L. W. Witt and H. C. M. Case.

The minutes of the previous executive meeting were read and approved.

F. F. Hill was appointed Chairman of the nominating committee for next year. The necessity of appointing an auditing committee for next year was called to the President's attention. The President indicated that he would request E. L. Butz and someone else to serve in that capacity.

A motion was made and seconded to authorize the Secretary-Treasurer to purchase needed office equipment to an amount not exceeding $1,000. The motion was carried.

Lawrence W. Witt was appointed Editor for the calendar year 1952. He and his editorial council were instructed to select the best *Journal* article.

President Aull agreed to carry forward the work on a book of readings in agricultural marketing for Blakiston and Company.

Mention was made of a suggestion by Roy Gillette that a committee be appointed to work up statistics on farm employment. A motion was made that

the President appoint a committee to work on the project. The motion was seconded and passed.

H. B. James was appointed to work on membership; it was agreed that membership work should be in the nature of follow-up work for last year's effort, rather than a new drive.

L. H. Simerl submitted a budget for the 1951-52 year, compared with actual expenditures of 1950-51. It was amended to read as follows:

BUDGET

AMERICAN FARM ECONOMIC ASSOCIATION
JULY 1, 1951 TO JUNE 30, 1952

	Actual 1950-51		*Estimated 1951-52*	
Operating income				
Dues and subscriptions	$11,414.64		$ 9,850.00	
Back numbers	542.08		500.00	
Reprints	1,438.21		600.00	
Advertising	200.00		200.00	
Annual meeting	538.20		500.00	
Other	100.00	14,238.90	50.00	11,700.00
Operating expenses				
Journal printing	11,452.38		12,500.00	
Back numbers	660.00		200.00	
Postage and wires	375.81		375.00	
Annual meetings	613.83		600.00	
Editorial expense	742.00		750.00	
Office supplies	268.33		1,200.00	
Other	225.00	14,335.33	225.00	15,850.00
Operating loss		96.43		4,150.00
Dividends and interest		2,170.22		2,200.00
	Net gain	$ 2,073.79	Net loss	$ 1,950.00

ESTIMATED INCOME FROM DUES AND SUBSCRIPTIONS

Dues		
Regular members	50 prepaid	
Regular members	1,100 at 5.00	$5,500.00
Joint members	300 at 4.50	1,350.00
Junior members	150 at 3.00	450.00
Subscriptions		
Directs	150 at 5.00	750.00
Through agencies	400 at 4.50	1,800.00
Total		$9,850.00

It was moved and seconded to adopt the budget as a guide rather than as a rigid document. The motion was carried.

The matter of the apportionment of the $2 registration fee at the Conference was brought up. It was reported by Past-President Hill that certain expenses were to be taken from this fee, and it was anticipated that the remainder, if any, would be apportioned between the American Farm Economic Association and the Canadian Agricultural Economics Society on the basis of registrations.

The Secretary-Treasurer was advised to write off office supplies as an expense, not to show them as an asset.

The advice of C. L. Stewart, auditor of the Secretary-Treasurer's accounts, was called to the attention of the new Secretary-Treasurer. Stewart recommended that more complete records be kept of investments and that financial reports be prepared so as to be comparable with preceding years.

It was suggested that the Editor consider publishing a list of Ph.D. thesis topics, these to be considered on a calendar year basis.

A discussion developed regarding the number of pages to be printed in the *Journal* from the proceedings. It was emphasized that the length of the talks and reviews had been specified by the President, and that the editor was authorized to cut them to the prescribed limit.

Seven hundred *Journal* pages in addition to the proceedings for the new year was recommended to the new editor as a desirable mark at which to shoot.

A discussion arose relative to increasing the dues from $5 to some higher figure. It was agreed to leave the dues at $5.

George Aull instructed L. W. Witt to review the rates for advertising in the *Journal*.

A motion was made to instruct Don Paarlberg to provide a bond for himself to the sum of $25,000. The motion was seconded and carried.

Don Paarlberg was requested to arrange for the securities of the Association to be held in a safe deposit box, to be opened only by himself and Earl Butz jointly.

George Aull agreed to appoint an investments committee. The secretary-treasurer is to be a member of this committee and is to make no transfer of securities without consulting the committee.

In order to furnish transfer officers of corporations with the necessary evidence that the secretary-treasurer is authorized to transfer securities in the name of the Association, the following resolution was adopted:

"*Resolved*, That the Secretary-Treasurer (Don Paarlberg of West Lafayette, Indiana) be and is hereby authorized and empowered, for, and in the name and on behalf of this Association to take any and all such steps, and to do any and all such things, as may be necessary, required, and appropriate for, or in connection with, the purchase, acquisition, acceptance, handling, pledging, sale, or other disposition of stocks, bonds, and other securities belonging to the Association or pertaining to its business, including the execution, and delivery for and in the name and on behalf of the Association, of any and all endorsements, transfer and assignments of certificates of stocks, bonds, or other securities standing in the name of this Association, either for the purpose of sale or transfer, and all such other steps and action as may be necessary or proper in connection herewith."

The 1952 Annual Meeting was discussed by H. C. M. Case.

George Aull reported that as yet no invitations have been received with respect to the 1953 Annual Meeting. A balance was suggested of two meetings in the Midwest to three or four meetings in areas more distant from the "center of population" of the Association. H. R. Wellman was instructed to be in a position to receive invitations for the 1953 meetings.

Adjournment.

DON PAARLBERG, *Secretary-Treasurer*

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Nonmember subscription rates $5 annually.

GEORGE BANTA PUBLISHING COMPANY, MENASHA, WISCONSIN